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Caloric Value of Diabetic Diets

35th A.D.A. Annual Meeting, Minneapolis, October 21–24, 1952

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Fifty Years of Study of the Role of Protein in Nutrition[1]

HOWARD B. LEWIS, Ph.D.

Department of Biological Chemistry, Medical School, University of Michigan, Ann Arbor

MULDER, the Dutch chemist, in 1839 suggested the name "protein" and characterized the proteins as "unquestionably the most important of all known substances in the organic kingdom" (1). At the beginning of the present century, Verworn (2) reemphasized the importance of the proteins, "the proteins stand at the centre of all organic life." Today, after the passage of more than a century since Mulder, a period characterized by intensive study of proteins from the standpoints of both chemistry and nutrition, the proteins are still "first." In 1923, Lafayette B. Mendel of Yale commented (3) on the "glorification of the albuminous substances, an apotheosis which has persisted in its extreme form almost to the present time." Are we to interpret this as meaning that Mendel felt that proteins were overemphasized and would be supplanted as "first" by the new group of nutrients, the vitamins, in whose study his collaborator Osborne and he pioneered? The proteins in 1951 are still "first" and at no time in the last half century has the interest in this group of nitrogenous compounds been more intense. Despite the great advances in our knowledge of enzymes, hormones, vitamins, and other biologic essentials, we can still say with Verworn that "the proteins stand at the centre of all organic life."

It is the purpose of the present discussion to trace the development of some of our concepts of the place of the proteins in nutrition in the last fifty years, to demonstrate how new techniques and their applications have led us to some modifications of our viewpoint, but have not altered our concept of the proteins as the fundamental building stones of protoplasm. It will obviously be impossible to discuss all aspects of protein nutrition. We have chosen to consider the development of our ideas as to the protein requirements of man in health and disease, both qualitative and quantitative.

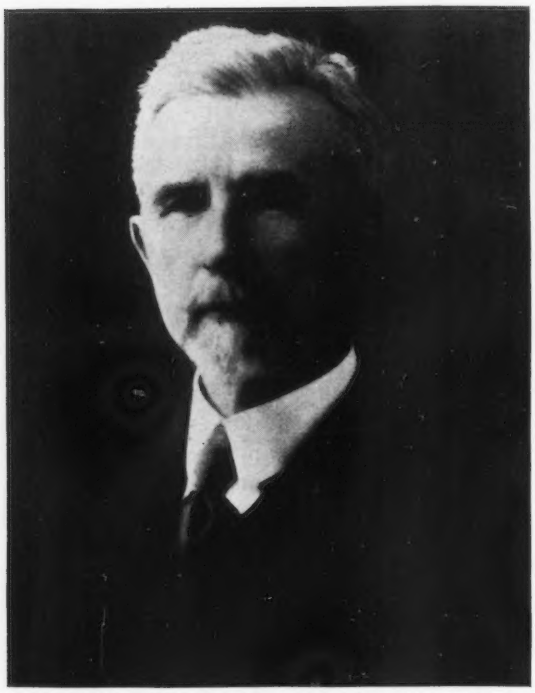
[1] Based on an address given at the 34th Annual Meeting of The American Dietetic Association in Cleveland, on October 11, 1951. Received for publication November 8, 1951.

HIGH AND LOW PROTEIN IN THE DIET

Toward the end of the nineteenth century, the great German physiologist and student of nutrition, Carl Voit of Munich, after a painstaking statistical survey of the diets of the German people, stated that 118 gm. protein per day were required by the adult man of average body weight doing moderate muscular work. This is equivalent to approximately 1.5 gm. dietary protein per kilogram per day. So great was the prestige of Voit that his "standard" was not seriously questioned for many years. Nutritional studies of groups of many nationalities and in many parts of the world showed that this amount of protein was commonly consumed, but there was no evidence that this accepted dietetic standard represented the requirements of the body. Surveys cast light on dietetic habits but supplied little information as to how far the diets in question served the real needs of the organism.

By the beginning of the twentieth century, there had begun to be some skepticism as to the essential nature of the relatively large quantity of protein supplied by the Voit standard diet. Was there any real scientific basis for the assumption that the average individual requires such a quantity of protein? Certain problems of economics and physiology needed also to be taken into account. Where cost is a factor, as in the nutrition of groups, it is not economical to utilize the expensive protein foods rather than the cheaper carbohydrates, as a source of energy. If the amount of protein of the Voit standard diet should prove to be twice the real needs of the body, economy would be achieved if the excess protein were replaced as a source of calories by starch or sugar. From the standpoint of physiology, the oxidation of protein results in the formation of nitrogenous products (chiefly urea), which ultimately are excreted by the kidneys. The disposal of these waste products may place upon these organs an unnecessary burden which might result in impairment of renal function or even serious injury.

In 1902, Russell H. Chittenden of Yale, one of the



Russell Henry Chittenden (1856–1943), Professor of Physiological Chemistry, Yale University

earliest investigators of the metabolism of protein in the United States, undertook the study of the problem of the dietary protein requirements of man. His approach to the problem is indicated by these statements (4): "If there is possible gain to the body from a practice of physiological economy in the diet, we should know how far this can be accomplished by simple restriction in the amount of food without complicating the problem by other factors" and "how far, if any, the intake of protein food can be diminished without detriment to the body, . . . and without impairment of bodily and mental vigor." He began his studies upon himself and continued with a group of university colleagues, a group of young male students, all thoroughly trained athletes, and a detail of volunteers from the Hospital Corps of the United States Army, representatives of the moderate worker.

These investigations are among the most extensive experiments with human subjects recorded in the literature and are noteworthy for duration of the experiments, numbers of subjects, control of diet, and other factors. (We had no trained dietitians in 1902!) Urines were collected and analyzed, nitrogen balances were determined, and careful physical examinations were made throughout the experimental period. It was shown that good health and nitrogen balance were maintained over periods of six months to more than a year on diets containing from 40 to 60 gm. protein, chosen, as is customary, from a wide variety of foodstuffs. These experiments were detailed by Chittenden in 1905 (4) and may be summarized in his own words: "Our results, obtained with a great diversity of subjects, justify the conclusion that the minimal protein requirement of the healthy man . . . is far below the amounts called for by the acquired taste of the generality of mankind. . . There is no question, in view of our results, that people ordinarily consume much more food than there is any physiological necessity for and it is more than probable that this excess of food is in the long run detrimental to health, weakening rather than strengthening the body and defeating the very objects aimed at." Thus the era of physiologic economy in nutrition and notably of the low-protein diet began in America.

The low-protein diet was, however, not accepted without challenge. McCay, a British army officer, long stationed in India, on the basis of his observations on the Bengalis who have subsisted for generations on a low-protein diet (37.5 gm. daily) pointed out the physical inferiority of this racial group, particularly manifested in their capacity for muscular work, and their increased susceptibility to kidney disease (5). He supported the Voit standard: "Voit . . . stands today absolutely vindicated; while the earnest plea put forward by Chittenden, for a lowering of the protein and caloric values of dietaries by large amounts, cannot be regarded as longer possible in the light of the ill-effects that follow in the train of chronic underfeeding."

Hindhede, a Danish physician, has been, perhaps, the most extreme of the advocates of the low-protein diet. A vegetarian, he extolled the Irish potato as a foodstuff, and in carefully controlled studies over considerable periods of time was able to obtain nitrogen balance with 25 to 30 gm. dietary protein per day (6). It is difficult for us today, accustomed as we are to diets moderately high in their protein content, to realize the vigor with which this high protein-low protein controversy raged. Hindhede wrote in 1913 (6): "Does it not appear to be quite in the order of things that practically we must always get enough protein for our needs if we eat as nature dictates? How otherwise could mankind have progressed so well since some hundred thousand years before Christ until A.D. 1866, in which year Voit stepped on the stage with his standard?"—and again one year later (6), "No one can deny that Liebig and Voit were great investigators, but the errors of great men are a hundred times more dangerous than the nonsense of the multitude. Thus the agitation in favor of meat has been disseminated throughout the world."

CURRENT VIEWPOINT

It was obvious that the recommendation for the daily protein supplied by the diet must be found between the extremes of these two groups, proper consideration being given to the factors of safety neces-

sary in all standard diets recommended for large groups. Henry C. Sherman of Columbia, in 1920, undertook a critical analysis of all the nitrogen balance experiments which were considered satisfactory (these included much of the data of Hindhede and Chittenden). Sixty-seven experiments on men showed (7) an average "indicated daily protein requirement" of 0.6333 gm. per kilogram of body weight, while, in forty-two experiments with women, the corresponding figure was 0.637 gm. Since for the "physiological" male, a weight of 70 kg. is usually assumed, this corresponded to approximately 44 gm. protein per day, a value within the range of those obtained by Chittenden. However, since a liberal margin of safety must be provided for, it was concluded that a "standard allowance of 1 gm. of protein per kilogram of body weight appears, therefore, to provide a margin of safety of 50 to 100 per cent as far as the requirements of adult maintenance is concerned." In a survey of 224 presumably typical American diets, the average protein content was stated to be 106 gm. or 140 per cent above the indicated maintenance requirement and 51 per cent above the recommended allowance (8). In only one of the 224 family groups studied was less dietary protein available than the indicated requirement; this diet was deficient in total calories, and if the total food had been increased to meet the caloric deficiency, there would have been ample protein.

In the years subsequent to 1920, the recommendations of Sherman were reviewed but were not questioned seriously. In 1948, the Food and Nutrition Board of the National Research Council (9) expressed anew its confidence in the values set forth by Sherman and recommended 70 gm. protein per day for an adult male, 70 kg. in weight. The writer has deliberately detailed this story of the evolution of the accepted protein allowance of the Food and Nutrition Board, since in some years of teaching, he has observed frequently that many students accept this and similar standard allowances as something arbitrarily conceived and not supported by years of careful investigation, in this case by the excellent work of Sherman in 1920, and consideration by students of nutrition for more than twenty years.

MEAT AND HIGH-PROTEIN IN THE DIET

One other general problem of protein in nutrition was of concern to investigators in the first quarter of the century, the possible injurious action of a high-protein diet with particular reference to the place of meat in the diet. By choice, in a country relatively undeveloped industrially and with an intensive agricultural economy, the per capita meat consumption in 1900 was high in the United States. In the highly industrialized overpopulated countries of Europe, of necessity, grains were used as bread, while Americans fed their grain to hogs or cattle and enjoyed meat. It was feared that high-protein (and meat) diets would increase the burden of excretion by the kidneys and hence predispose to renal disease. Interest in this problem was again stimulated in 1922 when the Arctic explorer, Vilhjalmur Stefansson, published his book, *The Friendly Arctic* (10), in which he pointed out that the Eskimos have lived on a high-protein (estimated by some to be as great as 500 gm. daily) almost exclusively meat diet for generations with no serious cardiac, vascular, or renal disease. Stefansson, with his associate Anderson, on his return to New York, subsisted for one year on an exclusive meat diet, while the usual activities were continued. There was no evidence of ill effects occasioned by the prolonged use of an exclusive meat diet (11–13).

While the possibility of injury by continued use of a high-protein or high-meat diet cannot be ignored, the question has ceased to be one of serious concern for a normal population. We believe that a significant proportion of the total protein of the diet (approximately 50 per cent) may with profit be obtained from animal sources, one of which, in periods of normal costs, may well be meat. However, this is largely a matter of tradition in our American living, and we lack satisfactory evidence of the desirable proportions of animal and vegetable protein in the diet.

CHEMICAL STUDY OF PROTEINS

Advances in our knowledge of the chemistry of the proteins and of their physiology have shifted the emphasis of the role of protein in nutrition to other aspects. In what has been discussed thus far, it has been assumed, as is usual, that dietary protein has been derived from a variety of sources, animal and vegetable, a well-balanced mixed diet. At the beginning of the twentieth century, although the concept of protein as a complex of amino acids was recognized, only twelve of the nineteen amino acids now well established as components of the protein molecule had been discovered, and of the ten amino acids now considered essential for growth of the young white rat, only five had been shown to be present in proteins. Valine and tryptophan were discovered in protein in 1901, isoleucine in 1903, methionine in 1923, and threonine in 1935.

Quantitative methods for the determination of amino acids in protein hydrolysates were so poor that the results obtained by their use were almost without value. This is shown in Table 1, in which a comparison of the known values for the essential amino acids of casein in 1910 and 1950 is presented. The weight of the products obtained on hydrolysis of protein is greater than the amount of protein taken for analysis since for each peptide linkage ruptured, one molecule of water is added. If a complete picture of the protein molecule is to be obtained, 115 to 120 per cent of amino acids should be recovered after hydrolysis. In 1910, only 51 per cent of a total of

TABLE 1
The essential amino acid content of casein as established in 1910 and 1950

AMINO ACID	RECOVERY	
	1910	1950
	%	%
Arginine	4.8	4.1
Histidine	2.6	3.2
"Leucines"*	10.5	15.3
Lysine	5.8	8.2
Methionine	—†	3.5
Phenylalanine	3.2	5.0
Threonine	—†	4.5
Tryptophan	1.5	1.3
Valine	1.0	7.2
Total essential amino acids	29.4	52.3
Total amino acids recovered	51.0	114.0

* Leucine and isoleucine.
† Not yet discovered.

114 (1950) could be accounted for or much less than half the molecule. The values for a few of the essential amino acids available in 1910 demonstrate further the incomplete knowledge of the protein molecule. Obviously, the role of protein in nutrition could not be interpreted in terms of the individual amino acids. Such knowledge has not been at our disposal until within the last decade.

PROTEIN IN THE ALIMENTARY CANAL

Despite the lack of satisfactory chemical information of the amino acids of the protein molecule, interest in the amino acids as units of proteins, important in nutrition, was apparent early in the twentieth century. Of the enzymes for the digestion of protein in the alimentary canal only two, pepsin (Schwann, 1836) and trypsin (Corvisart, 1856), were known in 1900. Since neither of these enzymes, acting alone or in sequence, could effect complete hydrolysis of protein, the absorption of a key building stone or nucleus of molecular size larger than a single amino acid, was postulated. Around this nucleus, amino acids split off in digestion would be reassembled in the body cavity proper. In 1901, Cohnheim (14) discovered in the enzyme, "erepsin," an agent which could, in conjunction with pepsin and trypsin, effect complete hydrolysis of protein to amino acids in the alimentary canal. Although Cohnheim's "erepsin" is now known to be a mixture of peptidases which can hydrolyze partially digested protein to amino acids, the importance of its discovery can hardly be overemphasized. Within a few years, amino acids had been detected in blood and tissues in fasting and in increased amounts during digestion and absorption of proteins and the era of the amino acids in nutrition had begun.

It was not enough to know that complete hydrolysis of proteins to amino acids was possible in the intestine. In passage through the wall of the intestine, might the amino acids be resynthesized into some protein designed to serve as the nutrient of tissues from which their own characteristic proteins could be built up? Such a synthesis of glycerol and fatty acids to triglycerides (fats) was known to occur in the intestinal mucosa, and only fat was present in the lymph. It was necessary to prove that satisfactory nutrition with the use of hydrolyzed protein could be accomplished without the intervention of the mucous membrane of the intestine. Could hydrolyzed protein meet the nutritional needs of an animal, if injected, i.e., by parenteral administration? This was accomplished in 1913 by Henriques and Anderson (15) with a goat, experiments which extended over a considerable time. The successful maintenance of these animals to whom the only nitrogenous food available was a protein hydrolysate injected intravenously made it unnecessary to postulate a synthesis of protein in the intestinal wall.

ESSENTIAL[2] AMINO ACIDS

"The current trend of the investigation of the chemistry of nutrition is emphasizing the significance of the amino-acids as the fundamental factors in all problems in which hitherto the role of proteins has been involved. . . The question of protein synthesis has now become a problem of the biochemical deportment of amino-acids" (16). These statements preface the studies of Osborne and Mendel on the role of the individual amino acids in determining the nutritive value of proteins (16, 17). A new experimental tool for investigations in nutrition, the young white rat, had become available; good growth of these animals was possible on a diet consisting in considerable part of purified food stuffs. When the only variable in the diet was protein, it was observed that adequate growth, an index of good nutrition, was obtained with proteins of such widely diverse biologic sources as casein of milk, ovalbumin of hen's egg, edestin of hemp seed, and glutenin of wheat, among many others. On the other hand, when zein of corn or gliadin of wheat supplied the protein, failure of growth ensued. Zein was known to lack tryptophan and lysine, and gliadin was deficient in lysine. When these amino acids supplemented the respective proteins, good growth was obtained without further alteration of the diet. It appeared that these two amino acids could not be synthesized by the animal cell and must be furnished preformed in the diet of the individual to permit continuation of vital activities, i.e., these amino acids were indispensable or essential in the diet.

[2] One of the earliest uses of "essential" as applied to amino acids and the problem of protein in nutrition is that of Osborne and Mendel in 1914 (16, p. 326), "one or more supposedly essential amino acids."

Thus the concept of the *essential* amino acid had its origin. However, nature was not so kindly disposed to the investigator in nutrition as to furnish proteins, specifically deficient in each of the nineteen amino acids of the protein molecule, for study of their essential character. Some other attack on this problem must be found. The simplest solution appeared to be the administration of the known amino acids as the sole source of nitrogen, in proportions which simulated those in a nutritionally valuable protein, an experiment which was undertaken repeatedly with negative results. Although satisfactory growth could be obtained if a protein hydrolysate was fed, ingestion of mixtures of pure amino acids led to nutritive failure. It was evident that protein and protein hydrolysates must supply some essential factor other than the known amino acids.

In 1935, Rose and his coworkers (18) isolated a new amino acid from proteins, to which the name "*threonine*," was given subsequently (19). When the new acid was included with the previously known amino acids in the diet, the first success in rearing animals on a ration containing purified amino acids as the sole source of dietary nitrogen was obtained (18). By the successive elimination of single amino acids from the mixture, it was now possible to characterize each naturally-occurring amino acid as essential or non-essential (20). For the *growing rat*, ten amino acids were found to be essential.

AMINO ACID REQUIREMENTS OF MAN

Subsequent studies showed that the amino acid requirements of the rat are not identical with those of other species. It remained to determine the amino acid requirements of man. Healthy young male students served as subjects, and nitrogen balance experiments were used as indices of the adequacy of the diets, the nitrogen for which was supplied by purified amino acids (21). Qualitative tests showed adult human males required only eight amino acids; histidine and arginine, essential for growth of the young white rat, were not required for the maintenance of nitrogen balance in man. In further experiments, tentative "minimum daily requirements" and "recommended daily intakes" of the eight amino acids, necessary as dietary components of the normal human subject, were suggested. Of these amino acids, tryptophan was required in smallest amount (0.25 gm. daily "minimum" and 0.5 gm. "recommended"). As Rose has stated (21): "It should be possible by reference to the values now made available, to predict with reasonable accuracy how much of a given protein, if its composition is known, will be required to maintain nitrogen equilibrium in the human organism, provided a sufficient supply of nitrogen to cover the synthetic needs of the cells is also included in the food."

Although the values proposed must be regarded as "strictly tentative", the work of Rose should make possible studies of the amino acid requirements as modified by such physiologic stresses as pregnancy and lactation in women, growth in the human child, and alterations in the normal requirements as a result of disease. We may confidently look forward to the solution of these and related problems in the next quarter century.

Thomas Burr Osborne (1859–1929) (left) and Lafayette Benedict Mendel (1872–1935)

RECAPITULATION

Karl Thomas in a lecture delivered in 1929 (22) listed the chief factors which are concerned in the determination of the biologic value of protein: "What we need to know is: 1. Which amino acids must be present in the food, 2. How much we require of each, 3. And to what purpose." Twenty years of investigation since Thomas have supplied the answer to the first question; the work of Rose has given a partial answer to the second as far as human requirements are concerned. The solution to the third query, "To what purpose?" is still before us. We know certain specific functions of some of the essential amino acids, e.g., phenylalanine as a precursor of diiodotyrosine and thyroxine and of epinephrine, the relation of tryptophan to the requirement and synthesis of niacin, but for the majority of the amino acids, the specific reasons for their essential nature, apart from their participation in the important general function of protein synthesis, are as yet unknown.

When all the problems of the essential amino acids are solved, we may confidently expect a renewal of interest in the aspects discussed at the beginning of this presentation, the protein requirements of man and their relation to health and disease. Important as the amino acids are experimentally and theoreti-

cally, we can hardly expect the human being to forego the gastronomic delights of a high-protein, particularly a high-meat, diet for the uncertain non-epicurean experience of a meal of crystalline amino acids, even though these may exactly meet his physiologic requirements.

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Low-Sodium Raised Cornmeal Muffins

During the summer of 1951, five graduate students[1] enrolled in a course in experimental cookery at Tuskegee Institute chose as their project the development of palatable low-sodium bread recipes which could be served to patients in the John A. Andrew Memorial Hospital.

One of the recipes developed was *Raised Cornmeal Muffins*:

1 c. scalded reliquefied low-sodium milk
¼ c. sugar
1¾ c. flour
1 c. white cornmeal
1 cake compressed yeast (10 gm.) dissolved in ¼ c. lukewarm water
¼ c. melted shortening
2 beaten egg yolks (45 gm.)

METHOD:

Combine shortening, sugar, and reliquefied low-sodium milk. Add dissolved yeast cake, beaten egg yolks, cornmeal, and enough flour to make a thick batter. Beat thoroughly. Cover and let rise until light. Fill greased muffin tins two-thirds full. Let rise until tins are full. Bake in 450°F. oven from 10 to 15 min. Makes 1 doz. muffins.

Analysis of these muffins by flame photometer in the Research Laboratory, Mead Johnson & Co., indicated the following: sodium, 22 mg. per 100 gm., and potassium, 214 mg. per 100 gm.

Other products which were developed by these students were: yeast biscuits, plain rolls, cinnamon buns, white loaf bread, whole wheat rolls, and whole wheat loaf bread. Sodium analyses indicated a range of from 27 to 51 mg. per 100 gm. for these products, while potassium ranged from 128 to 219 mg. per 100 gm.—*Fannie J. McEnge, Assistant Professor of Foods and Nutrition, Tuskegee Institute, Alabama.*

[1] Alta Mae Kemp, James A. Lomax, Thelma A. McDaniel, Vivian P. Magby, and Fannie R. Richardson.

Early Speculations on Diet and Longevity. II.[1]

ADELIA M. BEEUWKES

Associate Professor of Public Health Nutrition, University of Michigan, Ann Arbor

IN 1799, James Easton published a fascinating account on *Human Longevity: recording the Name, Age, Place of Residence, and Year, of the Decease of 1712 Persons Who Attained a Century and Upwards, from A.D. 66–1799, comprising a Period of 1733 Years. With Anecdotes of the Most Remarkable* (1). This book was dedicated to the "Oldest Man Alive."

> Whoe'er thou art, of whatsoever station,
> Kindly accept this humble dedication;
> And may You long the envy'd boon enjoy,
> Pure Nature's choicest gift, without alloy!—
> But while to You I dedicate my Page,
> O, might *THEY* listen—*THEY* of Younger Age!
> Who careless now, beneath the morning beam,
> Glide swiftly down Corruption's fatal stream.
>
> May *THEY* peruse, with profitable care,
> My Book—and learn, from each example there,
> To follow Nature, in her frugal plan,
> And thus to lengthen out their little span!
> Not Galen's skill, or Aesculapian rules,
> The pride of learning, or the boast of schools;
> But Temp'rance, Exercise, and all the train
> Of sober virtues, chace disease and pain:—
> So shall my humble labours merit praise,
> And future *PARRS* blest with honor'd days!

Easton paid particular respect to Thomas Parr who is claimed to have lived 152 years, through the reigns of ten kings and queens. Parr's autopsy was performed by the celebrated Dr. Harvey, and he was buried in Westminster Abbey. His great rules for longevity are now well known: "keep your head cool by temperance; your feet warm by exercise; rise early, and go soon to bed; and if you are inclined to get fat, keep your eyes open, and your mouth shut." Easton introduces his detailed account of these long-lived individuals with this statement (1): "It is not the rich and great, not those who depend on medicines, who become old; but such as use much exercise, are exposed to the fresh air, and whose food is plain and moderate, as farmers, gardeners, fishermen, labourers, soldiers, &c.; and such men, as perhaps never employed their thoughts on the means which have been used to promote Longevity. It is amongst these people, chiefly, that the most astonishing instances of it are to be observed. Sometimes, in these situations, man still attains to the amazing age of one hundred and fifty years, and upwards. And here I cannot deny myself the pleasure of giving a more particular account of some of these instances; for, in cases of this kind, the most trifling circumstance is often interesting, and may be of importance."

SINCLAIR

Sir John Sinclair (1754–1835) was a Scottish statesman and philanthropist who originated the Board of Agriculture in his country. Although his major publications were in his chosen field, agriculture, *The Code of Health and Longevity* (2) is one of the most interesting books on health published during the past century. Sinclair has well stated why attention to health is so often ineffectual. "People seldom attend to their health till it be too late. They scarcely ever think of it till it be seriously impaired. When they become feeble, then they wish to get strong; when they are diseased, they wish to become healthy. But when the constitution is broken, and the frame is hastening to dissolution, when death knocks at the portal, is the renovation of health to be looked for? No! The foundation ought to be laid early. The plan to be adopted, should begin in youth, and ought afterwards to be most rigidly persevered in. The happy effects of the system adopted, may then be expected in a healthy and comfortable old age. If we are to live wisely, says a great philosopher (Adam Ferguson), for the sake of longevity, our system is doubly fortunate; the end is good, and the means are better. Even if we miss the end, we are happy in using the means."

Although Sinclair does not present information dealing specifically with the relation of diet to longevity, much of the advice he offers, if followed, should have helped his readers to attain long life.

An Essay on the Disorders of Old Age, and on the Means for Prolonging Human Life (3) was written by an eminent English surgeon, Sir Anthony Carlisle (1768–1840), in 1819. The author chose to address

[1] Presented at the 34th Annual Meeting of The American Dietetic Association in Cleveland, on October 11, 1951.

his essay "principally to persons already advanced in years, and does not embrace the course of regimen which from an early period is best calculated to secure a long life." Carlisle respected diet as an important tool in preventive medicine and wrote: "The preventive art of Medicine, and the suitableness of Diet, are well worth considering; and in the autumnal season of life, they will be found to comprise the most rational and the most practical resources of information. For, without fear of contradiction, it may be asserted, that the wholesome regulation of diet, clothing, exercise and air, are often more important than the administration of drugs, blisterings, or bleedings. . . When it is considered that many serious disorders are entirely occasioned by improper diet, and that in almost every disease, the direction of diet is perhaps of equal importance with the prescription of medicines, it is blameable to neglect this potent resource, and to rely on the unaided administration from the Apothecary's stores of a few grains of materials, whose qualities are ill understood."

Although Paris (1785–1856) in *A Treatise on Diet* (4) did not refer particularly to longevity, his respect for dietetics is gratifying. "To those who question the value of dietetic regulations in the cure of disease, I have only to observe, that they may as well deny the utility of the medical art altogether, and assert that in all disorders of function, Nature is sufficiently powerful to rectify and cure them, without the intervention of art: Unless this be granted, it is absurd to say that beneficial impressions may not be made as well through the medium of the *materia alimentaria*, as through that of the *materia medica*: or, to borrow the language of Dr. Arbuthnot, that what we take daily by POUNDS must be, at least, as important as what we take seldom, and only by grains or teaspoonsful."

In a study of *The Health and Longevity of the Ancients and Moderns* (5), Dr. N. H. Allen, an American physician from Buxton, Maine, presents an interesting discussion of the dietary differences of the two groups. His plea for simple and good food preparation is sincere. Dr. Allen suggested that the major difference between the ancients (who were thought to have lived long) and the moderns (who appeared to be living shorter lives than the ancients) would be found in the diets the two groups consumed.

> It cannot be denied that a difference in diet will produce a corresponding difference in the health and constitution of different people. This is acknowledged by all who have paid attention to the effects which a peculiarity of diet is capable of producing. . .
>
> No one will pretend to say that the food of the ancients was not better calculated to fulfill all the purposes for which it is intended, than the food of the moderns. The ancients gratified the appetite with the natural food of man—food unmangled by the ten thousand operations of modern cookery, and which was calculated to satisfy the natural and unsophisticated appetite. They partook of the nutritious flesh of both wild and domestic animals; but that flesh was not tortured up into a thousand dishes, for the express purpose of pleasing the appetite and stimulating the natural desire for food. They also ate of the fruits of the field; but those fruits were not then spoiled, as they now too often are, by the art of refined cookery. They likewise drank the pure element; or if they partook of any cordial, they took that which was pure and unadulterated, such as the pure juice of the grape and not such vile compounds as the modern hucksters sell under the name of *wine*.
>
> It is not so now; gastronomy has been carried to a high pitch of perfection; and in exact proportion as this science has been cultivated, the powers of the stomach have been forced to suffer. The art of cookery, at the present day, does not consist in learning how to compound and cook food so that it may be the most easily digested, and the best fitted to sustain the functions of life, but rather that it may be the most tempting to the appetite. I would by no means recommend so great a simplicity of diet as has been urged by some of our wise modern philosophers. I would not confine the human race to the use of mashed potatoes, stewed apples and bran bread, even with the addition of a little butter. No, we should not think this the natural diet of man. In fact, this kind of diet is the farthest possible from natural diet, the whole *posse* of the moral reformers and would-be philosophers to the contrary notwithstanding. Human nature needs something more substantial than this. Let it have, for instance, a plenty of bread and beef; and a little wine, if properly taken, can do it no manner of harm. Give it good, wholesome, nutritious food, but let that food be properly cooked. We would not take it raw from the hand of nature, without any cookery to fit it for use; this would be as much as to say that we are unable to prepare the rough product and fit it for our wants. Neither would we have it spoiled by the art of cookery; this would be showing that we think too much of what we shall eat and what we shall drink. But we would have it prepared in such a manner that it retain all its natural nutritious qualities, and at the same time be palatable and wholesome. We cannot imagine that man can be reformed solely by attention to dietetic rules, as some have imagined; yet we are fully convinced, that if men would return more nearly to their pristine state of living, as regards their food, it would have a tendency to make them longer lived, and to elevate them in the scale of moral and intellectual beings.
>
> The foregoing are some of the most prominent circumstances which have tended to render the moderns inferior to the ancients as regards their morals, their intellect, their corporeal powers, and the length of their lives.

Dr. Day in *A Practical Treatise on the Domestic Management and Most Important Diseases of Advanced Life* (6) presents a delightfully simple and meaningless answer to all who seek to learn the secret of attaining long life. He wrote: "The rules for the attainment of a good old age are all comprised in a single sentence. Carefully avoid all such influences as tend to shorten the life span." This would be helpful, indeed, if only the influences had been defined. He suggested that abrupt changes in routines and habits of old people be avoided for "the constitution can no longer adapt itself to a change of circumstances." Food should be easy of digestion. He thinks "the chemistry of the kitchen" so important that he devotes much time to a discussion of food

preparation, often quoting Liebig. He advocates regularity and the ingestion of enough but not too much food. His dietary suggestions for the treatment of gout and rheumatism are those published frequently in the literature of the time.

"Longevity; the Means of Prolonging Life after Middle Age" (7) was the title of a paper written by John Gardner, M.D., in 1874. The author seemed concerned that the publications on this subject had dealt primarily with the diseases of old age and little had been written concerning the underlying causes for these diseases. He presented a plea for a further study of etiology of diseases of the aged, writing that it would indeed be a happy situation to possess a mystic elixir for preserving life. Having none, practical solutions must be learned by the medical profession. His instructions on diet were brief and not original: "As to food, common sense should suffice for every one to observe the effects of any course or article of diet, and to avoid any which is felt to be injurious. Generally, aged persons require a diet containing most nutrition in the least bulk. Hence animal substances should preponderate."

CHARCOT

The publication in 1881 of *Clinical Lectures on Senile and Chronic Diseases* (8) by Charcot (1825–1893) marks a milestone in the history of geriatrics. The change from individual speculation to physiology is a refreshing characteristic of this publication. "The importance of a special study of the diseases of old age would not be contested at the present day. It is agreed, in fact, that if the pathology of childhood requires clinical consideration of a special kind, and which it is indispensable to be practically acquainted with, senile pathology too has its difficulties, which can only be surmounted by long experience and a profound knowledge of its peculiar characters." Charcot's experience with the aged at Salpetrière Hospital was the basis for his observations, and he claimed (9) "that the pathology of old age was constructed and asserted, if I may be allowed the expression, in all its originality at this institution." This great publication devoted less than half a page to the subject of nutrition. Mention is made of the use of the thermometer in obtaining more precise ideas with regard to calorification, and some consideration is given to the dietary treatment for patients with diseases such as gout and rheumatism. The concept that nutrition might be a major concern in the aging process was not presented.

The *Journal of the American Medical Association* published a paper by J. M. French, M.D., on "Food and Hygiene of Old Age" in 1892 (10). He urged that the old adapt their diet to their needs and explained his theory in this manner: "The first necessity of age as of youth is food; but errors in diet are specially harmful now. The young man has a reserve of vitality to draw upon, and though he may suffer acutely for a time, when too much food is taken, or food of an improper character or not properly prepared, yet he soon throws it off, and does not seem to suffer permanently. But the old man's bank account is already overdrawn, and he is living from hand to mouth. The gluttonous debauch which in early life might only have caused him a day's discomfort from indigestion or of misery from a bilious attack would now be liable to result in sudden death. He must therefore carefully measure his digestive power, and adapt his food, both in quantity and kind, to the needs of his system." French recommended that the aged eat four meals a day, avoid stimulants, and choose soft food, but he offered no suggestions for the type of diet that would assist an individual to attain old age.

Publications of this period give growing evidence that serious consideration was then being given by some members of the medical profession to care of the aged. S. G. Dorr, M. D., writing on *Care and Treatment of Old People* (11) reiterated the need for adapting the food to the needs of the individual.

NASCHER

In 1909, I. L. Nascher (1863–1944) suggested the term "geriatrics" to cover a special branch of medicine dealing with old age and the diseases of the aged. An eminent Greek scholar, Dr. Achilles Rose, pointed out the faulty construction of the word and suggested the term "gerontiatrics," but Nascher retained the simpler term as a euphonic expediency. In 1914, Nascher published the first textbook devoted in its entirety to geriatrics (12). Jacobi, known as the "father of pediatrics," wrote the preface to this book, calling it the first modern comprehensive text on abnormal and normal old age. As one reads this classic publication, the defects indicate that today knowledge has passed far beyond that available to Dr. Nascher in 1914. When it was written, however, it was the only textbook of its kind and opened the way to progress in this field.

Nascher's advice on diet is of particular interest because it represents the best thinking of the medical profession at the turn of the century on the relation of diet to the aging process and to the aged. Read this text with reference to the time it was written, realizing that we still do not have all of the clinical and research tools necessary to condemn or condone the dietary suggestions (12):

> The diet of the aged must be regulated by the state of the teeth, stomach and intestines, and by the metabolic activity and assimilation. The senile organism requires less food, it can dispose of less food, and less is assimilated. Owing to the changes in the stomach, digestion is slower and weaker. With bad teeth the food is not properly masticated, consequently it is swallowed in lumps, which are digested with difficulty or not at all. Prosthesis can remedy this defect, and here again it is often necessary to play upon his pride in appearance to induce him to undergo the annoyance and sometimes positive distress connected with the making and wear-

ing of artificial teeth. Women submit to these discomforts more readily than men, for their natural vanity induces them to appear attractive, even when extremely old.

Gourmands who are accustomed to eat too much will not break themselves of the habit when they become old unless gastritis and diarrhea make a limited diet imperative. The oft-repeated advice that the aged should eat little and often is irrational, for digestion is naturally slower in old age and frequent feedings keep the stomach constantly at work, there being always a mass of food in the stomach in different stages of digestion. This is of the most frequent cause of flatulence, heart burn and senile gastric catarrh with its attendant pyrosis and gastrodynia.

In old age, food should be taken not oftener than once in five- or six-hour intervals at fixed hours each day. The number of meals, like the time of day when the principal meal is taken, is a matter of habit, often of nationality, and does not affect the rule. A few simple directions will serve better than any fixed diet list.

If food cannot be masticated it should be chopped up fine or administered in the form of mush. No food should be taken between meals. Milk, buttermilk, weak tea, coffee, strained cocoa, can be taken, however, preferably an hour after meals. Meat should be used sparingly, not oftener than once a day, preferably underdone. Pork is forbidden. Fish and shell fish may be taken if they do not produce ill effects but if they harm once, they will harm again. Vegetables containing much fiber like cabbage, turnips, carrots, sweet potatoes, etc., leave a large amount of waste and induce peristalsis. The cereals and the breakfast foods are all good. "Wine is the milk of the aged." Light wines like Hock, Moselle, Claret, Burgundy, etc., are the best. Port, old Sherry and Madeira wines contain too much alcohol. Beer and ale may be taken if they do not produce flatulence or pyrosis. The day should be begun with a glass of hot water containing a little table salt or if constipation exists a teaspoonful of any of the cathartic salts, and at night a glass of hot milk may be taken before going to bed.

As the aged person is liable to awake during the night a glass of milk can be left at the bedside. Gastric and intestinal disorders may necessitate modification of these rules. A safe general rule is to avoid all purin-forming substances, foods containing much cellulose and foods containing a large percentage of water. This will hold good for all conditions. Notwithstanding all that has been said and written against drinking and smoking most men who have reached advanced age have indulged in both. Everything in excess is harmful. As for the determination of what is excessive, every man is his own judge. When a man has lived so rational a life that he has reached old age it can be safely left to his own judgment to decide how much he can drink and smoke without harm.

Although much has been written of the hopes of men of all times to learn the secret of longevity, Edmund Goldsmid who edited *Hermippus Redivivus*, written by Johann Heinrich Cohausen (1665–1750), reminds us that just adding years is not the only road to happiness (13): "Some misguided enthusiasts have believed that by lengthening life they would confer a priceless boon on the human race; forgetting that it is not the length of day which makes us love the summer but the brightness of the sun, the beauty of the flowers, the singing of the birds."

And now our little panorama of what some men have thought and written about the relation of diet to longevity comes to a close. We have witnessed the birth of geriatrics as a specialty in the field of medicine; we have watched speculation sink behind a cloud while the bright rays of science begin to present the picture of the aging process, without shadows cast by ignorance and indifference. With humility and eagerness we look to the future to define the relation of diet to longevity; perhaps we look to the day when science will be completed. A French medical writer, Requin (1803–1855) expressed this thought so well (9): "The day when science shall have attained a complete knowledge of normal man, to the very depths and inmost parts of his organization, and into the most secret mysteries of his life; the day when science shall have unveiled all the secrets of the pathological condition, and understand every modification that external agents can produce in the economy—that day science will be completed."

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The Dietary Record—How Many and Which Days?[1]

FAITH W. CHALMERS[2], MARY M. CLAYTON, Ph.D.[3], LORRAINE O. GATES[4], RUTH E. TUCKER, Ph.D.[5], ANNE W. WERTZ, Ph.D.[6], CHARLOTTE M. YOUNG, Ph.D.[7], and WALTER D. FOSTER, Ph.D.[8]

MANY studies have been made concerning the nutritive quality of the diets of various population groups. Although several methods have been used in the collection of data for these dietary studies, the one most widely used for research purposes has been the dietary record which consists of a detailed, quantitative listing of all foods consumed by an individual over a given period. Whenever the use of a dietary record has been discussed, there has been considerable doubt concerning the minimum number of days over which a record must be kept to yield accurate information. For example, when studying a given community, the research worker not only must be certain that the dietary record covers a sufficient period to furnish an adequate picture of nutrient intake, but also must avoid prolonging unduly the period of record-keeping lest the interest and cooperation of the subjects be lost. Many research workers also feel that an extended period of record-keeping decreases the subject's accuracy in reporting subsequent food intake.

REVIEW OF CURRENT PRACTICE

Although little factual information is available on this subject, many authorities feel that a dietary record covering a period of (a) seven consecutive days or (b) twenty consecutive meals is the shortest length feasible from the standpoint of accuracy. However, field units operating under the direction of the U. S. Public Health Service obtain dietary information by use of the one-day dietary record (1). They believe that a larger number of accurately taken one-day records are as useful as a smaller number of seven-day records.

There has also been some debate as to the need for obtaining data concerning nutrient intake on Saturdays, Sundays, and holidays. It is the general opinion of many research workers that eating habits of certain population groups, such as college students, tend to vary considerably on Sundays and other holidays (2, 3).

SOURCE AND NATURE OF DATA

In a regional study of the nutritional status of various population groups in the northeastern part of the United States which is being conducted by the agricultural experiment stations of Maine, Massachusetts, New Jersey, New York, Rhode Island, and West Virginia, an attempt has been made to answer the above questions. Dietary data collected in this cooperative study were obtained through the use of the seven-day dietary record, the dietary history, and the 24-hr. recall. Detailed information concerning the methods used is given in the regional publication on *Techniques* (4). A discussion of the seven-day record vs. the dietary history vs. 24-hr. recall also may be found in two regional papers (5, 6).

Portions of the data collected by means of the seven-day dietary record were used in this study of "how many and which days." By use of the food tables of the U. S. Public Health Service (7), these records were calculated to determine each subject's intake of calories, protein, calcium, phosphorus, iron, vitamin A, thiamine, riboflavin, niacin, and ascorbic acid on the seven days of the week. In Table 1 is shown the distribution of subjects whose dietary

[1] This paper is the result of work done as part of the Nutritional Status Project NE-4 being conducted cooperatively by agricultural experiment stations of the Northeastern Region, supported in part by 9B3 funds appropriated under the Research and Marketing Act of 1946. Received for publication September 14, 1951.

[2] West Virginia Agricultural Experiment Station, Morgantown.

[3] Maine Agricultural Experiment Station, Orono.

[4] New Jersey Agricultural Experiment Station, New Brunswick.

[5] Rhode Island Agricultural Experiment Station, Kingston.

[6] Massachusetts Agricultural Experiment Station, Amherst.

[7] Cornell University Agricultural Experiment Station and the School of Nutrition, Cornell University, Ithaca.

[8] Biometrician NE-4 at West Virginia Agricultural Experiment Station, Morgantown.

records were thus calculated. In addition, twenty-eight-day dietary records obtained from sixteen women and two men at the New York Agricultural Experiment Station[9] and fourteen-day records obtained from thirteen women at the Massachusetts Agricultural Experiment Station have been examined in this study.

OBJECTIVES

Data obtained from these dietary records have been studied in an effort to obtain answers to the following questions:

I. How many days should a dietary record include
   A. When the dietary intake of a group is estimated?
   B. When the dietary intake of an individual is studied?
II. Which days should be included in a dietary record
   A. When a group is being studied?
   B. When an individual is studied?
III. How many subjects should a dietary study of a population group include?

HOW MANY DAYS?

In seeking the answer to "how many days," it was necessary to estimate the correlation in dietary intake which may exist between consecutive days. Upon examination of the twenty-eight-day and fourteen-day dietary records, in addition to the seven-day records, it was found that this correlation is virtually zero. Thus consecutive days can actually be considered as independent (Appendix A). On the basis of this finding, it was then possible to use analysis of variance and variance components in the pursuit of the original objectives.

For a Group

By the use of variance components (Appendix B), it was found in the 150 analyses representing all nutrients and all population groups studied that a dietary record need consist of only one day when characterizing the dietary intake of a group. Since this answer held true without exception and is based on data taken from a wide range of persons, there is little reason to doubt that this conclusion may be applied to similar groups. In recommending a one-day record to characterize group intake, it is interesting to note that this answer is based on the relative importance of the number of days as compared to the number of subjects. To obtain an estimate of the mean intake for a group with greater precision, it is more efficient to take more subjects, not more days.

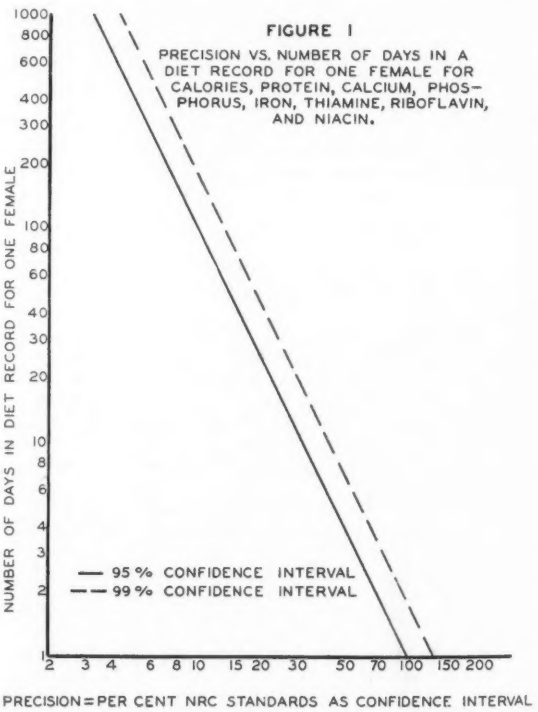
[9] The authors are indebted to Ruth E. Franklin, New York State College of Home Economics, for these data.

For an Individual

For an individual, a direct answer to the question of "how many days" would require extensive research on that particular person. Indirectly, an answer is available from the results of the group study discussed above. The number of days to be included in the dietary record depends on the precision required, which in general means the repeatability of a result. For this study, precision was measured as per cent of Recommended Dietary Allowances related to the 95 (and 99) per cent confidence interval. In estimating a mean intake, 95 per cent confidence limits are set on either side of this mean to indicate that the true intake would fall within this interval 95 times in 100 in repeated measurements. Thus, the narrower the confidence interval is, the more precise the estimate.

Figures 1 and 2 show the average relationship of precision to the number of days in a dietary record for an individual. In using these logarithmic graphs, it is first necessary to decide on the degree of precision desired. The actual number of days in a dietary record required to achieve this precision then may be read directly.

For example, in estimating the mean caloric intake of a man, a 95 per cent confidence interval equal to 30 per cent of the recommended allowance, i.e. 15 per cent on either side, might be selected. The 30 per cent line is then located on the abscissa of the graph (Fig. 1). Reading up the graph from this 30



per cent line, the number of days required would be fourteen. Suppose a physically active man had an estimated mean intake of 2800 calories. Then 95 per cent confidence limits based on the recommended allowance of 3000 calories would be 2800 ± 15 per cent of 3000. On the average, this man with an estimated intake of 2800 calories would have (95 times in 100) an actual intake ranging between 2350 and 3250 calories. It is evident from Figures 1 and 2 that precision tended to be greater for women than for men. Thus, to estimate a woman's caloric intake with the same degree of precision as that described above, the diet record need cover only eleven days.

As indicated in Appendix C, these graphs are applicable to all population types similar to the ones studied. The calculations for these graphs were based on the average precision for all nutrients except vitamin A and ascorbic acid. Actually, some nutrients were better estimated than others; those with the highest precision included calories and protein, while those of the lowest precision were riboflavin and calcium. Since these differences from the averaged precision did not exceed 3 per cent of the number of days needed, little error was involved by assuming that the nutrients were equally well estimated.

The vitamin A values, however, which showed extreme fluctuation, could not be used in the calculations for these graphs. Since these values were not at all comparable with the other nutrients, it is recommended that total vitamin A as calculated at the present time no longer be included in estimates of dietary intake for an individual. A further breakdown of total vitamin A values into actual vitamin A and its precursors or into animal and vegetable vitamin A might possibly reduce this variation and actually carry more meaning in characterizing dietary intake.

Dietary ascorbic acid also possessed marked variation, although to a lesser degree, and was excluded from the calculations for Figures 1 and 2. When it is particularly desirable to estimate ascorbic acid intake with the same degree of precision, it would be necessary to take 10 per cent more days than indicated on the chart. Thus, in the cases cited above, the period of record-keeping should be extended to cover fifteen days for a man and twelve days for a woman.

WHICH DAYS?

The problem of "which days" is particularly important when dietary records are taken for one day. If a "day effect" should exist, such as a Tuesday or a Friday effect, it would become necessary to select a day representative of all seven.

For a Group

From the 150 analyses of variance, there were no significant differences beyond chance occurrence between days for any of the nutrients or for any of the population types except one. Even though the averages were not exactly the same from day to day, they still were not sufficiently different to warrant the exclusion of certain days. The one group which did not conform to this pattern were the college students studied both in Rhode Island and in West Virginia where there was a distinct decrease in food intake on week-ends.

Even though days were not found to be significantly different, there could be a small but persistent tendency for certain days to show a greater intake than others. If it exists, this tendency should appear in a table of ranks, where the day of greatest intake for a group is given a rank of one and the day of lowest intake a rank of seven. Thus, when averaged over the ten nutrients, the closer the ranks cluster to a mean of 4.0, the more alike the days appear. The greater the spread, the stronger is the tendency to be different. The results for the groups studied are given in Table 1 for ten nutrients.

According to this reasoning, even though Junior High School I in Maine, which showed a wide spread in its ranks, might offer evidence of high intake on Sunday and low intake on Saturday, other junior high schools at Maine negated this trend. Thus, the averages of the Maine schools failed to demonstrate any consistent day effect on intake.

Likewise for pregnant women in Massachusetts, there was some tendency for higher intake on Mon-

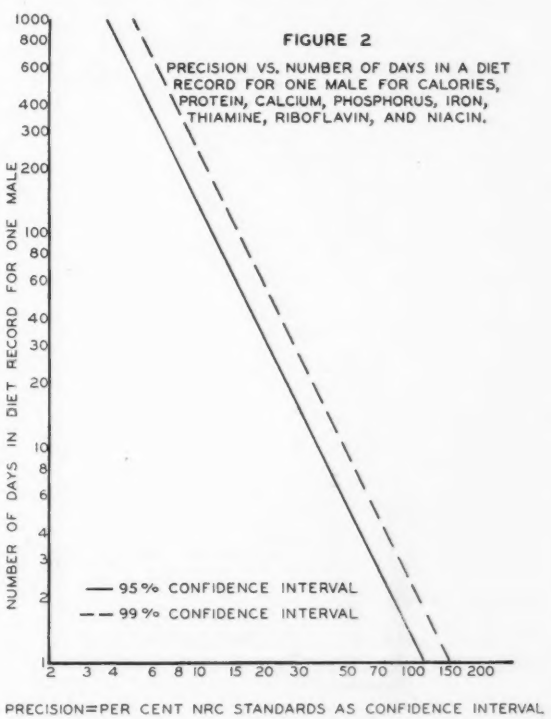


FIGURE 2

PRECISION VS. NUMBER OF DAYS IN A DIET RECORD FOR ONE MALE FOR CALORIES, PROTEIN, CALCIUM, PHOSPHORUS, IRON, THIAMINE, RIBOFLAVIN, AND NIACIN.

day following a low intake on Sunday. The New Jersey industrial workers seemed to eat equally well on all days except Saturday.

The New York junior high schools on the average presented evidence of nearly equal intake for all days. To be sure, some of the individual grades showed a spread of ranks which might be indicative of a local trend. Greater substantiation of any local trend might be found by averaging the ranks at any one school. For example, in Junior High School II, it might be inferred that the eighth and ninth graders tended to eat well on Sunday as compared to Saturday.

The average of the college groups in Rhode Island indicated strongly that the students ate differently over the week end when compared to the rest of the week. This conclusion was substantiated in the figures from the college students in West Virginia.

It is apparent, then, from this table that some trends do exist, especially for certain groups. Combining the results of this table with those of the analyses of variance which showed no clearly defined day effect, we conclude that it is immaterial which day or days one selects for a record, provided no distinct tendency for a specified population has been found. That is, the absence of a day effect might be expected but should not be assumed without investigation.

TABLE 1

Rank of daily intake averaged for ten nutrients† for each station and subgroup*

GROUP	NUMBER OF SUBJECTS	RANK						
		Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Maine								
Junior high school I	19	1.8	3.1	3.6	5.8	4.8	2.7	6.2
Junior high school II	17	6.2	3.9	2.7	5.2	3.0	3.9	3.1
Junior high school III	21	5.0	2.8	2.5	2.9	6.5	3.1	5.2
Average		4.3	3.3	2.9	4.6	4.8	3.2	4.8
Massachusetts								
Pregnant women	26	5.0	1.4	5.8	4.4	2.8	4.0	4.5
New Jersey								
Male industrial workers	29	3.9	3.8	4.5	4.7	4.6	4.3	2.2
New York								
Junior high school I, 8th grade	18	2.2	4.8	2.4	5.8	3.5	4.0	5.3
Junior high school I, 9th grade	22	4.4	3.7	4.5	6.5	1.5	4.9	2.5
Junior high school II, 8th grade	85	2.4	4.6	2.4	5.8	3.6	4.1	5.3
Junior high school II, 9th grade	48	2.7	4.4	3.0	2.3	4.2	5.7	5.9
Junior high school III, 7th grade	24	4.7	5.5	1.7	3.8	5.1	2.9	4.3
Junior high school III, 8th grade	17	3.4	3.0	4.5	4.9	3.0	3.0	5.8
Average		3.3	4.3	3.1	4.8	3.5	4.1	4.8
Rhode Island								
Senior high school	10	3.3	3.8	4.6	3.4	5.0	5.9	2.0
College students I	12	5.0	3.6	3.7	2.7	4.3	4.4	4.3
College students II	16	6.9	3.7	1.1	3.9	3.5	3.1	5.8
Average college		6.0	3.6	2.4	3.3	3.9	3.8	5.0
West Virginia								
College students	87	5.7	6.2	5.3	1.5	2.6	2.2	4.5

* With each nutrient, the day of greatest intake for a group was given a rank of 1 and the day of lowest intake a rank of 7. When averaged over ten nutrients, the closer the ranks cluster to a mean of 4.0, the more alike the days appear.

† Calories, protein, calcium, phosphorus, iron, vitamin A, thiamine, riboflavin, niacin, and ascorbic acid.

For an Individual

As in the case of "how many days" for an individual, a direct answer to the problem of "which days" is not available. However, judging from the group findings reported above, it seems safe to assume that, for an individual, the days selected could run consecutively from any starting day as long as estimated from the graphs in Figure 1 or 2. For example, in a ten-day record started on Sunday in which Sunday, Monday, and Tuesday are repeated, the effect of omitting the remainder of the week would be negligible as far as bias due to day differences is concerned.

HOW MANY SUBJECTS

These data which have provided answers to the questions "how many" and "which" days also offer a basis for determining the number of subjects needed in a group for a specified precision when measured on one day. Using the same technique as indicated above in prescribing the number of days, the number of individuals can be selected so that the estimate of the mean for the group will have a desired precision. In presenting one graph, Figure 3, approximately equal numbers of men and women subjects are assumed. Thus, to put 95 per cent confidence limits on either side of the mean of a group equal to 10 per cent of the National Research Council standard, the number of subjects required would be sixty, recalling that the confidence interval here is twice the confidence limit. As before, estimation of vitamin A is not covered by this graph, and for ascorbic acid the inclusion of six additional subjects would be recommended. For a group of women, the estimate from the graph for the number of subjects required can be reduced 5 per cent for the indicated precision. Likewise, for a group of men, the estimate should be increased 5 per cent. A brief outline of the statistical technique involved is given in Appendix D.

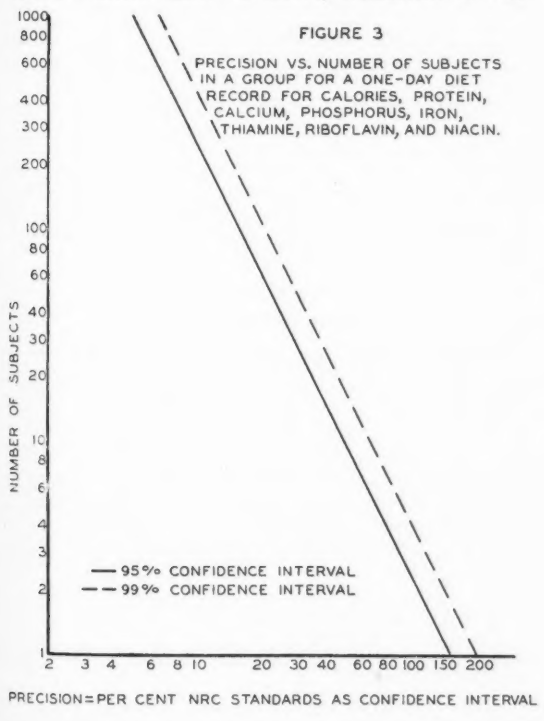


FIGURE 3

PRECISION VS. NUMBER OF SUBJECTS IN A GROUP FOR A ONE-DAY DIET RECORD FOR CALORIES, PROTEIN, CALCIUM, PHOSPHORUS, IRON, THIAMINE, RIBOFLAVIN, AND NIACIN.

It is possible in estimating the mean intake of a specific group that a sample of more than twenty-five subjects might not be available. The question then arises whether it is worth while taking more than one day. This is best answered by referring to Figure 4 in which logarithmic graphs are presented showing the increase in precision resulting from increasing the number of days in the dietary record for two small groups. For example, in a group of ten subjects, the increase in precision resulting from taking seven days instead of one is 13 per cent, going from 45 to 32 per cent of the standard. Note that it is virtually impossible to improve the precision beyond 30 per cent in this example, no matter how many days are taken.

DISCUSSION

For an estimate of the mean intake for a group, the use of a one-day record rather than a three-day record obviously represents great savings in time, money, and personnel. Anyone who has actually attempted to obtain the cooperation of a group in keeping a seven-day record, translated the foods into nutrient quantities, and computed the desired averages will appreciate the efficiency implied in this conclusion. In addition, there is a great advantage in having a knowledge of the degree of precision

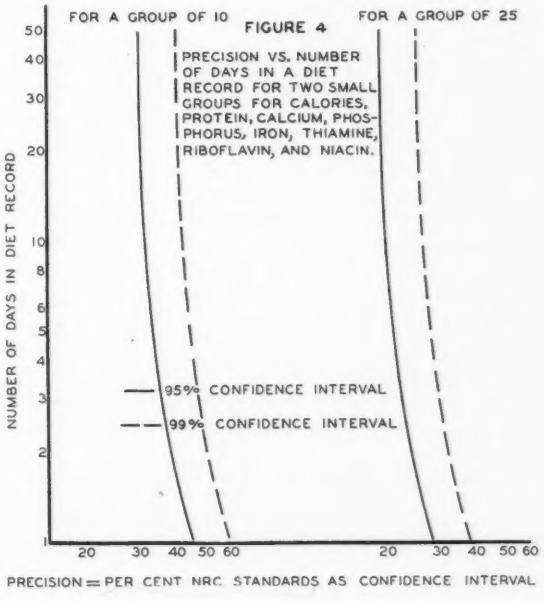


FIGURE 4

PRECISION VS. NUMBER OF DAYS IN A DIET RECORD FOR TWO SMALL GROUPS FOR CALORIES, PROTEIN, CALCIUM, PHOSPHORUS, IRON, THIAMINE, RIBOFLAVIN, AND NIACIN.

which on the average can be assumed in characterizing diets in population types similar to these.

A further implication is psychologic in nature. A group of subjects instructed to keep a one-day record may subconsciously eat a better diet than usual, thus introducing a bias which could void the results of the survey. If this is an important objection, the method of 24-hr. recall might be substituted for the one-day record. In a comparison of seven-day record and 24-hr. recall (6), it was found that one method might be substituted for the other under certain conditions. Thus, it seems reasonable to assume that a one-day record and a 24-hr. recall would be substantially equivalent, especially if the recall were taken by a trained interviewer.

SUMMARY

To answer the question, "how many and which days should be used in a dietary record?" seven-day records were taken for junior high pupils in Maine and New York, pregnant women in Massachusetts, high school and college students in Rhode Island, college students in West Virginia, and industrial workers in New Jersey, together with twenty-eight-day records and fourteen-day records on miscellaneous mature subjects in New York and Massachusetts respectively. The seven-day records were a portion of the data collected by the six agricultural experiment stations cooperating in the Northeast Regional Nutritional Status Project.

For characterizing a group by its mean intake, a one-day record was found to be the most efficient when the relative importance of the number of days was compared to the number of subjects. A graph is presented from which the number of subjects necessary for a given precision could be estimated.

On the average, it was immaterial which day was chosen, since no "day effect" could be discerned with the exception of the college groups which seemed to have an understandably lower intake over the week end. It is recommended before surveying any particular group that this conclusion *not* be assumed without investigation.

On an individual basis, the number of days needed for a desired degree of precision is given in the form of a logarithmic graph.

For groups of ten and twenty-five subjects, logarithmic graphs are presented showing the increase in precision when the number of days in the dietary record is increased from one to fifty.

The methods used in the statistical analyses are outlined briefly in the Appendix.

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APPENDIX A

Consecutive Days Are Independent

Detailed examination of eighteen twenty-eight-day records and thirteen fourteen-day records in addition to the seven-day records failed to give evidence of any serial correlation as defined and tabulated by Anderson (8) in consecutive days. There was no evidence of autocorrelation as described by Orcutt (9) in either the days themselves or the residuals. A third check consisted of computing the regression of $\sigma^2(1 - \rho)/r$ estimated from consecutive days on σ^2/r estimated from random days, where ρ is the correlation between every pair of residuals as described by Cochran (10). For $\rho \neq 0$, the regression coefficient should deviate noticeably from unity; because it did not, the hypothesis of zero correlation was retained. Assuming normality, it was concluded with the finding of zero correlation that consecutive days may be considered as independent.

APPENDIX B

Variance Components

The model used for the analyses of variance is given by

$$Y_{jk} = m + D_j + I_k + e_{ij}, \quad j = 1 \cdots d, \; k = 1 \cdots i,$$

where Y_{jk} = observation on kth individual for the jth day
D = day effect, $N(0, \sigma^2_D)$
I = individual effect, $N(0, \sigma^2_I)$
e = residual, $N(0, \sigma^2)$.

The problem was to minimize the variance of the grand mean, i.e., $Y\ldots$, subject to a cost or convenience function approximated from consideration of computing time and subjects' cooperation. This expression is written as

$$V(Y..) = \frac{\sigma^2}{id} + \frac{\sigma^2_D}{d} + \frac{\sigma^2_I}{i} + \lambda(C),$$

where C = cost per individual relative to an additional day and evaluated as

$$C \leq 1.0.$$

Solution of the equations resulting from $\frac{\partial V(Y\ .\ .\ )}{i} = 0$ and $\frac{\partial V(Y\ .\ .\ )}{d} = 0$ gave the result, $d = \sqrt{C}\ \sigma/\sigma_I \leq 1.13$, since σ^2_D was estimated to be zero.

APPENDIX C

Development of the Measure of Precision for Number of Days

The 95 per cent confidence limits for the mean of d days for an individual are given by $Y.k \pm t_{.05}\ \sqrt{\sigma^2/d}$, where σ^2 is the average variance of an individual's intake on one day. Therefore, the 95 per cent confidence interval divided by the Recommended Dietary Allowance (hereafter termed NRC) offers an index of precision given by

$$P = \frac{C.I.}{NRC} = \frac{2t_{.05}}{\sqrt{d}}\ \frac{\sigma}{}.$$

Solving for $\sqrt{d}$ we have $\sqrt{d} = \frac{2t_{.05}\sigma}{PNRC}$. Since the ratio, σ/NRC, was found to be constant by sex for all population types, this relationship was valid for any group or individual (on the average) and can be assumed to apply to population types similar to these.

Confidence limits on d are available directly from the consideration that s^2/σ^2 is distributed as chi-square. For example, the upper and lower 95 per cent confidence limits on an estimate of fourteen days for an individual male are 17 and 11 respectively.

APPENDIX D

Development of Precision for Number of Subjects

Similar to the procedure above, the 95 per cent confidence limits for the mean of a group of i individuals for one day are given by

$$Y_{i\cdot} \pm t_{.05}\sqrt{\frac{\sigma^2 + \sigma_I^2}{i}}.$$

Solving for $\sqrt{i}$, we have $\sqrt{i}, = \frac{2t_{.05}}{P}\ \frac{\sqrt{\sigma^2+\sigma_I^2}}{NRC}$ where again the ratio, $\frac{\sqrt{\sigma^2 + \sigma_I^2}}{NRC}$, was constant by sex for all population types. For illustration, the upper and lower 95 per cent confidence limits on an estimate of sixty persons in a group are 74 and 46 respectively.

Highlights of the Convention Program

Predictions may safely be made at this time for a top-rate 35th Annual Meeting. Judging from the caliber of the speakers and their subjects, the interest quotient of the week's offerings will be extraordinarily high. So broad is the coverage of topics that A.D.A. members in all fields of activity will find sessions of special value to them.

Opening speaker of the meeting will be Dr. Reuben Youngdahl, minister of Mount Olivet Lutheran Church, Minneapolis. His subject will be "A Better You Makes a Better World." During a recent world tour, Dr. Youngdahl interviewed such leaders as Bishop Berggrav in Norway, Bishop Dibelius in Berlin, Dr. Edwin Moll in Jerusalem, Prime Minister Nehru, and Madame Pandit.

Returning to this country, following a year in Europe as Senior Fulbright Fellow at Oxford University and Visiting Research Associate at the Universities of Naples and Madrid, Dr. Ancel Keys, Director, Laboratory of Physiological Hygiene at the University of Minnesota and an international authority on nutritional anthropometry, will discuss "The Diet and Health Problems of the Western World."

If it were not for the value of its practical application, John S. Pearson's session of psychodramas might be called a four-star performance in sheer entertainment. Mr. Pearson will demonstrate the use of psychodramas as a technique in solving on-the-job problems of the dietitian and nutritionist, during two afternoon programs. He is associated with the Division of Public Institutions of Rochester State Hospital, Minnesota.

Dr. Grace Goldsmith, Professor of Medicine, Tulane University, and Dr. J. E. Rhoads, of the University of Pennsylvania's Department of Surgery, who are both members of the Food and Nutrition Board, National Research Council, are scheduled to speak at the Tuesday evening session on "Nutrition Advances." On the same program will be Dr. Olaf Mickelsen, Assistant Chief, Laboratory of Biochemistry and Nutrition, National Institute of Arthritis and Metabolic Diseases, who will discuss the research in human nutrition which is being conducted by the Institute.

Those who are seeking a fresh viewpoint in food administration will be interested in the sessions on the appraising of food quality, food technology, food test panels, recipe testing, food protection, and other related subjects.

Three speakers eminently capable of throwing a clarifying light on the highly controversial subject of weight reduction are Dr. Ruth Leverton, of the University of Nebraska and author of *Food Becomes You*, who will speak on "Comparison of Low-Calorie Diets"; Dr. Daniel A. Glomset, a physician of Des Moines, Iowa, formerly of the Mayo Clinic, whose topic will be "Philosophy of Adiposity"; and Dr. Fredrick J. Stare, who will describe the studies on weight reduction conducted by the Department of Nutrition, Harvard School of Public Health.

Like any preview, such a brief summary as this can only touch on the highlights of what promises to be an informative and challenging program.

Ascorbic Acid Nutrition of Children[1]

MARGARET H. DALLYN and DOROTHY S. MOSCHETTE[2]

Department of Home Economics, Louisiana Agricultural Experiment Station, Louisiana State University, Baton Rouge

ONE means by which latent nutritional deficiencies in a population group might be uncovered is through nutritional surveys of grade school children. While advanced stages of nutritional deficiency are rare, mild deficiencies which indirectly affect health and efficiency are widespread. Severely impaired health and other damaging results of childhood malnutrition might often be prevented if the early evidence of deficiency is discovered.

In 1950–51, a nutrition survey was made of white Louisiana school children, ages eight through eleven years, as part of a Southern Regional nutritional status study[3]. The primary purpose of the over-all study was to evaluate the methods of nutritional assessment. Therefore, no attempt was made to take a statistical sampling of the subjects. Approximately the same number of children were tested in each location, however, and there was an equal distribution between the ages included. The following methods of assessment were used: dietary records of foods consumed over a seven-day period, physical examinations for certain signs and symptoms indicative of dietary deficiencies, determinations of height and weight, and biochemical tests for hemoglobin, serum vitamin A, serum carotene, and serum ascorbic acid.

The report presented here concerns that phase relating to ascorbic acid nutrition. Although there is a low incidence of frank scurvy among school children in the United States, subclinical scurvy or hypovitaminosis C is considered to be fairly common. The lack of ascorbic acid in the diet may not be great enough to cause actual scurvy, but a slight deficiency can cause minor changes in the body which are too important to neglect (1).

The two purposes in studying ascorbic acid nutriture of Louisiana children were: (a) to determine the serum ascorbic acid values and the ascorbic acid intakes of grade school children in certain locations of the state, and (b) to determine by certain statistical analyses whether any association existed between ascorbic acid intake and serum content, or between serum ascorbic acid and physical signs of hypovitaminosis C.

SUBJECTS

Five hundred and fifty-two grade school children, ages eight through eleven years, were the subjects of a nutrition survey begun in the winter of 1950 and continued through the fall and winter of 1951, excluding the summer months. The Louisiana elementary schools included in the study were: Plaquemine, Covington, Highland, Woodlawn, Gentilly Terrace, and Bossier City. Highland and Woodlawn are located in Baton Rouge, and Gentilly Terrace in New Orleans.

Crescent Elementary School was also studied, but the results were not included because the children were given extra quantities of grapefruit juice in the morning shortly before blood samples were taken. Under those circumstances, the serum ascorbic acid levels were believed to be abnormally high.

METHODS

Serum ascorbic acid values were obtained for 463 subjects; 300 of the values were averages of two determinations made one week apart, and the remaining 163 were single determinations. All analyses were done in duplicate. An analysis of variance of the duplicate determinations, to be published later, showed that there was no significant difference between duplicates. For each test, 10 cu. mm. serum from finger-tip blood were used. The ascorbic acid was determined by an adaptation of the method of Lowry, Lopey, and Bessey (2), using the Beckman spectrophotometer.

Under the direction of the same physician[4], 432

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[2] The authors gratefully acknowledge the assistance of Echo P. Cheely in the biochemical analyses. They are also indebted to Laureame C. McBryde for making the necessary contacts and arrangements with school officials; to Grace Goldsmith, M.D., for conducting the physical examinations of the subjects; and to Ray Loree, Ph.D., for his helpful suggestions in the statistical analyses.

[3] Southern Regional Research Project S-15—Nutritional Status.

[4] Grace Goldsmith, M.D. School of Medicine, Tulane University, New Orleans.

children were examined for signs of ascorbic acid deficiency. The signs studied included gum changes only, because it is generally agreed that in hypovitaminosis C, characteristic gingival lesions appear (3). Although the desirability of a slit-lamp examination was recognized, such a technique was impossible, and only the gross changes were noted. Those changes included: marginal redness, marginal swelling, atrophy of the papillae, recession with debris, and bleeding.

Seven-day dietary records were kept for 454 subjects. The average daily intake of ascorbic acid was calculated from each record. The vitamin content of most of the foods was determined from tables published by the U. S. Department of Agriculture (4) but a few values were taken from Bowes and Church (5).

The chi-square test was applied to determine whether any association existed between ascorbic acid intake and serum content. The amount and kind of association was found by the calculation of the Pearson's product-moment correlation coefficient. The "t" test (6) was applied to the correlation coefficient to determine its significance. Use of the correlation coefficient was justified by plotting the lines of regression.

The chi-square test was also applied to determine whether any association existed between blood values and gum changes.

RESULTS

The serum ascorbic acid values of Louisiana school children were found, on the whole, to be low. A serum concentration of 0.6 mg. or more per 100 ml. has been used by many workers as a standard, and the American Academy of Pediatrics (7) has suggested that such a value indicates a satisfactory state of ascorbic acid nutriture. Only 48.6 per cent of the 463 children studied had serum levels of at least 0.6 mg. per 100 ml. (Table 1). Most of the children at Highland and Gentilly Terrace seemed to be in a satisfactory state. At Highland, of the eight- and nine-year-olds, 82.4 per cent had values meeting or exceeding this standard, and 62.5 per cent of the ten- and eleven-year-olds had such serum values. At Gentilly Terrace 64.4 per cent of the eight- and nine-year-olds and 67.2 per cent of the ten- and eleven-year-olds were at or above the 0.6-mg. level. Among the other children, less than 50 per cent in each group, with the exception of the eight- and nine-year-olds at Woodlawn, had such serum values. When classified according to age, 50.6 per cent of all the eight- and nine-year-olds and 46.6 per cent of the ten- and eleven-year-olds had serum levels at or above 0.6 mg. per 100 ml. (Table 1).

The dietary sources of ascorbic acid with the percentage received from each source are listed in Table 2. Over 50 per cent of the ascorbic acid value of the diets, as calculated, was derived from citrus fruit, both raw and canned as juice, and raw tomatoes and strawberries. In these foods, the *pH* is such as to assure a relatively stable source of ascorbic acid.

Less than 13 per cent of the total ascorbic acid content of the diets came from cooked vegetables other than potatoes. The values used for computing the contribution for cooked vegetables, such as cabbage, green beans, and turnip and mustard greens were those stated for long cooking methods (4). These values were for green vegetables whether

TABLE 1

Distribution of serum ascorbic acid levels among 463 subjects according to age groups

SERUM ASCORBIC ACID LEVEL	8-TO-9-YEAR-OLD CHILDREN		10-TO-11-YEAR-OLD CHILDREN	
	Number	Per cent	Number	Per cent
0.2 mg./100 ml.	9	3.9	6	2.6
0.2–0.3 mg./100 ml.	59	25.5	59	25.4
0.4–0.5 mg./100 ml.	46	19.9	59	25.4
0.6–0.7 mg./100 ml.	29	12.6	21	9.1
0.8–0.9 mg./100 ml.	26	11.3	24	10.3
1.0–1.1 mg./100 ml.	19	8.2	23	9.9
1.2–1.3 mg./100 ml.	10	4.3	12	5.2
1.4–1.5 mg./100 ml.	12	5.2	14	6.0
1.6–1.7 mg./100 ml.	14	6.1	6	2.6
1.8–1.9 mg./100 ml.	4	1.7	6	2.6
2.0 mg./100 ml. and above	3	1.3	2	0.9
Total	231	100	232	100
Per cent at or above 0.6 mg./100 ml.		50.6		46.6

TABLE 2

Percentage distribution of ascorbic acid intake from various food groups

FOODS	PER CENT OF ASCORBIC ACID INTAKE
Fruits	
Citrus, strawberries, raw tomatoes	29.05
Citrus and canned tomato juice	24.25
Others	
Raw	4.99
Canned	1.59
Cooked	0.62
Total	60.50
Vegetables	
Raw	4.87
Canned	2.11
Cooked	
Potatoes, Irish and sweet	9.22
Others (long cooking method values used [4])	12.77
Total	28.97
Milk	10.50

they were overcooked or not to guard against an over-estimation of ascorbic acid. The nutritionist on this project visited each school during the lunch period, took the food records, and checked the foods served. The vegetables and fruits eaten at the school lunches were known not to be overlooked.

Pasteurized milk and potatoes were used in such quantities that they made a valuable contribution to the total ascorbic acid intake. These children averaged nineteen ½-pt. servings of milk a week and four or five servings of potatoes.

Distribution of the dietary intakes of ascorbic acid according to age is shown in Table 3. The daily allowance of ascorbic acid recommended by the National Research Council (8) is 60 mg. for children seven through nine years. Of the 225 children in this age range, 138 (61.3 per cent) received at least this amount. The intake recommended by the National Research Council (8) for children ten through twelve years is 75 mg. As shown in Table 3, only 101 of the 229 children ten and eleven years old, or 44.1 per cent, were receiving daily intakes of at least 70 mg.; however, approximately 34 per cent had an intake of at least 80 mg. per day. Fifty-five per cent of the ten- and eleven-year-olds had intakes of at least 60 mg. daily. The actual intakes of the two age groups were similar, but when the data were compared with the recommended allowances according to age, the eight- and nine-year-olds showed a closer approach to the suggested intake than did the older children.

Table 4 contains certain data pertaining to the ascorbic acid intake and serum content for each age and school group, as well as for the total population group. The highest mean serum levels were found at Highland and Gentilly Terrace. Means of 1.1 and 0.9 mg. per 100 ml. serum were obtained for eight- and nine-year-olds and ten- and eleven-year-olds, respectively, at Highland. At Gentilly Terrace, the mean for both groups was 0.9 mg. per 100 ml. With the exception of Covington and the eight- and nine-year-olds at Plaquemine, the means for serum levels all reached 0.6 mg. per 100 ml. or above. The range of values, however, was wide and, as shown in Table 1, only one-half of the serum levels were at or above this figure. The mean ascorbic acid intakes were high, with the exception of Plaquemine. Here again, however, the range of values was wide, and the high mean could be misleading. As shown earlier, approximately three-fifths of the children were receiving at least 60 mg. ascorbic acid daily.

The chi-square test was applied to the data in Table 5. A greater number of individuals with low ascorbic acid intakes were in the low blood level group, and a larger proportion of those with high blood levels were in the high intake group. The value for chi-square indicated a significant association between intake and serum content of ascorbic acid ($P < 0.001$). A correlation coefficient of +0.41 was found between ascorbic acid intake and serum

TABLE 3

Distribution of ascorbic acid intakes among 454 subjects according to age groups

AVERAGE DAILY ASCORBIC ACID INTAKE	8-TO-9-YEAR-OLD CHILDREN		10-TO-11-YEAR-OLD CHILDREN	
	Number	Per cent	Number	Per cent
10 mg.	0	0	0	0
10–19 mg.	3	1.3	9	3.9
20–29 mg.	14	6.2	12	5.2
30–39 mg.	20	8.9	26	11.3
40–49 mg.	23	10.2	24	10.5
50–59 mg.	27	12.0	31	13.5
60–69 mg.	25	11.1	26	11.4
70–79 mg.	20	8.9	24	10.5
80–89 mg.	18	8.0	19	8.3
90–99 mg.	17	7.6	19	8.3
100–109 mg.	11	5.0	10	4.4
110–119 mg.	13	5.8	5	2.2
120–129 mg.	6	2.6	8	3.5
130–139 mg.	5	2.2	5	2.2
140–149 mg.	4	1.8	0	—
150 mg. and above	19	8.4	11	4.8
Total	225	100	229	100

TABLE 4

*Mean serum ascorbic acid levels and ascorbic acid intakes with ranges**

SCHOOL AND AGE OF STUDENTS	SERUM ASCORBIC ACID			ASCORBIC ACID INTAKE		
	Subjects	Mean	Range	Subjects	Mean	Range
		mg./100 ml.	*mg./100 ml.*		*mg./day*	*mg./day*
Plaquemine						
8–9 years	18	0.5	0.2–1.7	17	57	25–125
10–11 years	9	0.7	0.3–2.1	9	59	15–105
Covington						
8–9 years	52	0.5	0.1–1.7	52	77	25–165
10–11 years	52	0.5	0.1–1.8	50	65	15–245
Highland						
8–9 years	34	1.1	0.3–2.1	34	77	15–195
10–11 years	32	0.9	0.3–2.1	32	76	25–135
Woodlawn						
8–9 years	27	0.7	0.3–1.2	27	96	25–215
10–11 years	25	0.6	0.2–1.3	25	73	25–215
Gentilly Terrace						
8–9 years	59	0.9	0.1–2.4	52	94	15–265
10–11 years	61	0.9	0.2–1.9	61	76	15–245
Bossier City						
8–9 years	41	0.6	0.1–1.6	43	77	15–275
10–11 years	53	0.6	0.1–1.8	52	70	25–175
All groups	447†	0.7	0.1–2.4		74	15–275

* Standard deviation for serum levels was ±0.15; for intakes, ±43. The correlation coefficient between ascorbic acid intakes and serum levels was 0.41.

† This number represents the total number of subjects from whom both intake and blood values were obtained.

TABLE 5

*Fourfold table analysis of ascorbic acid intakes and serum levels with application of chi-square**

DAILY ASCORBIC ACID INTAKE	SERUM ASCORBIC ACID LEVEL		TOTAL
	Less than 0.6 mg./100 ml.	0.6 mg./100 ml. and above	
0–39 mg.	68	16	84
40+ mg.	163	200	363
Total.....	231	216	447

* $X^2 = 35.5$
$P < 0.001$

levels. When the "t" test was applied, the correlation was found to be highly significant ($P < 0.01$).

The chi-square test was used to determine whether any association existed between the serum ascorbic acid levels and the degree of gum changes which usually occur in hypovitaminosis C. In arranging the data in Table 6, arbitrary ratings were assigned to the gum changes. The ratings were based on information in previous reports (3) and recommendations of the examining physician. When no gum changes were present, the rating of 0 was assigned. If marginal redness in a +1 degree (according to the physician's rating) was present, a rating of 1 was assigned. A rating of 2 was used when marginal redness in +2 and +3 degrees and/or bleeding was present. Other gum changes, such as marginal swelling, atrophy of the papillae, and recession, were considered too unspecific for use in a statistical examination. The value for chi-square of 10.65 ($P < 0.01$) indicated that there was significant association between the degree of gum changes and serum ascorbic acid levels. A larger proportion of individuals with low blood levels than with high levels had a gum rating of 2.

DISCUSSION

The serum ascorbic acid levels were somewhat lower than values found by other workers. In a nutrition survey in Middle Tennessee, Youmans *et al.* (9) showed that 61 of 66 children, ages seven through nine years, had serum ascorbic acid values of at least 0.6 mg. per 100 ml.

Several workers have compared serum values found in the spring with those found in autumn. Pierce *et al.* (10) found that 30 per cent of 350 Vermont children in the spring and 71 per cent in the autumn had serum levels of 0.6 mg. or above. Minot *et al.* (11), studying a group of "normal" children in a Tennessee pediatric clinic, showed that 41.6 per cent in the spring (February 1–June 1) and 63.7 per cent in summer and early autumn (June 1–October 1) had values of above 0.7 mg. per 100 ml. Crane and Woods (12) found that only 13 per cent of 86 Maine village children in the spring and 15 per cent in the autumn had values of 0.8 mg.

TABLE 6

*Contingency table with application of the chi-square test to serum ascorbic acid levels and gum changes**

DEGREE OF GUM CHANGES	SERUM ASCORBIC ACID LEVEL		TOTAL
	Less than 0.4 mg./100 ml.	0.4 and above mg./100 ml.	
0	95	283	378
1	16	20	36
2	9	9	18
Total.....	120	312	432

* $X^2 = 10.65$ $P < 0.01$

The children at Plaquemine, Covington, and Bossier City were examined in the spring, while the children at Highland, Woodlawn, and Gentilly Terrace were examined in the autumn and winter. Since different subjects were used in each group, no real comparison can be made. Nevertheless, it is interesting to note that the serum levels in the fall studies were higher than those in the spring. Such a difference could be attributed in part to a higher intake of fresh vegetables in the fall and of Louisiana citrus fruit in the winter.

In studying relations between factors affecting ascorbic acid nutriture, the chi-square test was found useful. The test shows only that an association exists and does not indicate the kind or amount of association. It should be of value, however, to those interested in determining the magnitude of deficiency problems among groups.

Conflicting reports are found in the literature on the relation between blood content of ascorbic acid and gum changes. Crane and Woods (12) found evidence of an association between presence of inflammation of the gums and low plasma ascorbic acid in Maine school children. Youmans *et al.* (9) reported that an apparently significant relationship was found between the presence of gingivitis and the concentration of ascorbic acid in the blood of a rural population of Tennessee. Minot *et al.* (11) found little evidence of scurvy in a group of children in a southern pediatric clinic, although malnutrition was prevalent. They suggested that bodily processes might have been slowed to such an extent among extremely malnourished individuals that symptoms of nutritional diseases failed to appear. Kruse (3) found no evidence of a relationship between plasma ascorbic acid values and chronic gingival lesions.

Some factors which might affect the relation between serum ascorbic acid values and gum changes are as follows: (a) Serum values, as a rule, reflect recent dietary intake. (b) Tissue changes occur more slowly. (c) An individual might exist on a low ascorbic acid intake with a resultant low serum level for a long time before the tissue is affected. (d) Likewise, an increased intake might cause a rise in serum values before tissue lesions disappear.

A significant association between ascorbic acid intake and blood content was indicated by the chi-square obtained by four-fold analysis of the data. The kind and amount of association was indicated by the highly significant positive correlation coefficient (+0.41) showing that, on the whole, the blood values were expected to rise as the intake increased, and vice versa. When regression lines were plotted, as shown in Figure 1, it was evident that the assumed linearity ceased at higher levels of both intake and blood content. Instead of single values, the means of the columns and rows of a correlation table were used. When blood values were plotted in terms of intake, the means departed from linearity at intakes above 110 mg. The mean intakes departed from linearity at blood levels of 1.1 mg. per 100 ml. Similar results were reported by Putnam *et al.* (13), who found that the observed means of plasma ascorbic acid for intake categories above 60 mg. in one group and 70 mg. in another ceased to lie along the regression line. They also found little rise in intake for plasma levels of 1.0 mg. and over.

The non-linearity of the data at intakes above 110 mg. and blood levels of 1.1 mg. is not surprising, since it is generally thought that intakes above 100 mg. and blood values above 1.0 mg. normally indicate an approximate saturation zone of ascorbic acid nutriture. Another factor which should be considered is that, at higher levels of both intakes and blood values, the data are based on scattered results from fewer subjects.

SUMMARY

A study was made of the ascorbic acid nutriture of 552 Louisiana children, ages eight through eleven years. The ascorbic acid intake and serum content was determined and the gum condition noted. Statistical methods were applied to determine whether any significant association existed between the factors affecting ascorbic acid nutriture.

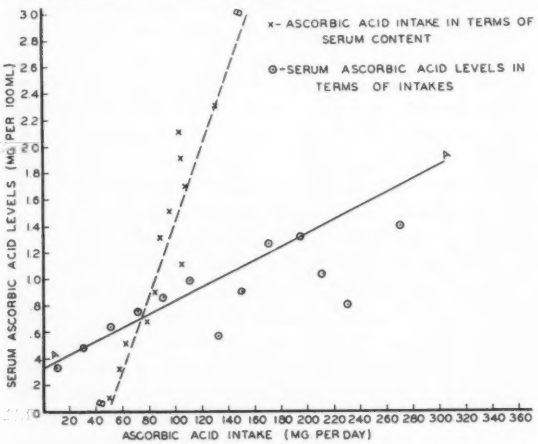
x- ASCORBIC ACID INTAKE IN TERMS OF SERUM CONTENT
⊙-SERUM ASCORBIC ACID LEVELS IN TERMS OF INTAKES
SERUM ASCORBIC ACID LEVELS (MG. PER 100 ML.)
ASCORBIC ACID INTAKE (MG. PER DAY)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360

FIG. 1. *Regression lines of serum ascorbic acid levels on intakes and of intakes on serum levels.*

Approximately one-half of the serum values were 0.6 mg. per 100 ml. or above and three-fifths of the subjects were receiving at least 60 mg. ascorbic acid daily. About 61 per cent of the eight- and nine-year-olds and 44 per cent of the ten- and eleven-year-olds were receiving the daily allowance of ascorbic acid recommended by the National Research Council. Fifty-one per cent of the eight- and nine-year-olds and 47 per cent of the older children had serum ascorbic acid levels of 0.6 mg. per 100 ml. or above.

Significant association was found between ascorbic acid intake and blood content and between serum levels and gum changes characteristic of hypovitaminosis C. Linear correlation between ascorbic acid intake and blood content ceased at intakes above 110 mg. and at serum levels of 1.1 mg. per 100 ml. or above.

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Formula and Methods for Preparing a Cake Mix in Quantity[1]

MARIE E. KNICKREHM, KATHARINE W. HARRIS, and KARLA LONGRÉE, Ph.D.

Department of Institution Management, New York State College of Home Economics, Cornell University, Ithaca

PREPARED mixes have been available to the homemaker for several years. World War II gave impetus to the manufacture and use of these products in the home and in large-scale food service.

Experimental work on cake mixes for home use was done at Cornell University by Pimentel (1) and others, and work on the development of a master mix for quantity food service has been reported by Sunderlin (2) and by Kirkpatrick and Sunderlin (3).

The purpose of this study was to develop a quantity cake mix that would result in savings of time and money and give an acceptable product. It was felt that a mix for a specific purpose would be easier for less experienced people in a food service operation to prepare than a basic mix formula.

A controlled study was undertaken to develop a formula and method of preparing the cake mix and the batter in quantity (4). New York State soft wheat pastry flour was used throughout this study. (New York State produces a large quantity of high grade soft wheat, and the millers are attempting to find more outlets for soft wheat pastry flour.) Institutional equipment was used in doing the experimental work.

Density and viscosity determinations were made on the batters, and the finished cakes were measured for volume and compressibility values. The cakes were scored subjectively by a panel of experienced judges. The qualities scored were: texture, tenderness, moistness, crumbliness, and general acceptability.

The cake mixes and batters were prepared in either a three-speed electric mixer with a 20-qt. bowl, or a three-speed electric mixer with a 60-qt. bowl, depending upon the quantity being prepared. The cakes were baked in electric ovens with thermostatic heat control. The ovens were preheated to 350°F.; the layers required 20 to 25 min. to bake.

Several plain cake formulas were compared. The judges' comments and ratings of the cakes prepared from these formulas served as the basis for the selection of a formula for developing the mix.

The cake mix was made in quantities of 10, 30, and 60 layers, the formula for 60, 20-oz. layers being given in Table 1. The quantity in which the mix was made had no apparent effect on the quality of the resulting cake.

TABLE 1

Formula and procedure for preparing the cake mix in sixty, 20-oz.-layer quantities

INGREDIENTS	WEIGHT	PER CENT OF FLOUR WEIGHT
Shortening	10 lb.	47.0
Sugar	21 lb.	100.0
Flour*	21 lb.	100.0
Baking powder	15 oz.	4.4
Salt	3 oz.	0.7
Powdered milk	2 lb. 4 oz.	11.0
Total	55 lb. 6 oz.	

* N. Y. State soft wheat pastry flour.

Procedure:

1. Cream shortening on second speed for 1 min. Scrape bowl and paddle and cream 1 min. more.
2. Add 2 lb. sugar to shortening and cream for 1 min. on second speed. Scrape bowl and paddle. Repeat this step until 10 lb. sugar have been creamed with the shortening.
3. Thoroughly mix flour, remaining sugar, powdered milk, baking powder, and salt.
4. Add 6 qt. blended dry ingredients to the creamed shortening and sugar. Blend on first speed for 30 seconds.
5. Add remaining dry ingredients. Start the machine on first speed with the bowl down and gradually raise the bowl. Mix for 45 seconds.

Mix should appear light and fluffy. It should be stored in tightly covered containers until used.

[1] Presented by Marie E. Knickrehm in partial fulfillment of the requirements for the degree of Master of Science in institution management. Received for publication December 12 1951.

TABLE 2

Ingredients and procedures for making plain, white, cocoa, chocolate, and spice cakes in amounts to yield ten, 20-oz. layers

INGREDIENT	WEIGHT OR MEASURE				
	Plain cake*	White cake†	Cocoa cake‡	Chocolate cake §	Spice cake‡
Cake mix	9 lb. 3 oz.	9 lb. 3 oz.	9 lb. 3 oz.	9 lb. 3 oz.	9 lb. 3 oz.
Egg yolk	10 oz.		10 oz.	10 oz.	10 oz.
Egg white	1 lb.	1 lb. 12 oz.	1 lb.	1 lb.	1 lb.
Water	2 lb. 12 oz.	2 lb. 10 oz.	3 lb.	3 lb. 3 oz.	2 lb. 10 oz.
Vanilla	1 oz.	1 oz.	1 oz.	1 oz.	1 oz.
Cocoa			7½ oz.		
Chocolate, bitter				15 oz.	
Cinnamon					3 Tbsp.
Cloves					1 Tbsp.
Nutmeg					1½ Tbsp.
Allspice					1½ Tbsp.

* *Procedure:*

1. Add all of the eggs, vanilla, and half of the water to the cake mix; blend on first speed for 1 min. Scrape bowl and paddle.
2. Mix on second speed for 2 min. Scrape bowl and paddle.
3. Add remaining water and mix on first speed for 1 min. Scrape bowl and paddle.
4. Mix on second speed for 2 min. Scrape bowl and paddle.

Batter should be well mixed and free from lumps.

† *Procedure:*

Add egg whites in same manner as whole eggs in the plain cake. Then proceed as for plain cake.

‡ *Procedure:*

Blend cocoa or spices with cake mix. Then proceed as for plain cake.

§ *Procedure:*

1. Melt bitter chocolate and add to cake batter after second quantity of water has been added.
2. Blend batter an additional 2 min. on second speed.

The mix was stored in tightly covered metal cans in a storeroom with a temperature range of 65° to 75°F. Some samples of the mixes were stored two to three months. The storage appeared to have no influence on the quality of the cakes made from the mix, although the number of studies was insufficient to be conclusive.

ADDING LIQUID INGREDIENTS

Three methods of adding the liquid ingredients to the mix were studied. The method in which all of the liquid ingredients were added to the dry mix and blended was satisfactory when only ten layers of cake were being made. When this method was used with larger quantities of batter, the mixture was not smooth and the cake did not meet the established standard. Two other methods were tried: (a) two-thirds of the combined liquid ingredients were added to the mix and blended, then the remaining liquid ingredients were added and blended; and (b) the eggs, vanilla, and half of the water were added to the mix and blended, then the remaining water was added and blended. The cakes made by these two methods were equally acceptable, but the second method seemed to be the most convenient. It was selected as the method to be used in this study.

Cake batters were prepared from the mix in 10-, 20-, and 30-layer quantities. The judges' scores indicated that there was no difference in general acceptability among the cakes made from batters in these quantities. Furthermore, no value differences in volume or compressibility of the cakes was apparent as a result of increasing the quantity of batter prepared at one time.

Students in the quantity cookery classes prepared the mix and also the cake batter from the mix. The finished cakes were comparable to any that had been made during the experimental work.

Variations of the plain cake which were made and found satisfactory were white, cocoa, chocolate, and spice cake. The ingredients and procedures for making batter for these variations are given in Table 2. These quantities are sufficient to make 10, 20-oz. layers of cake; 20 or 30 layers of cake may be made without any change in the proportion of ingredients.

COST AND PREPARATION TIME OF THE MIX

A comparison was made of the cost per pound of the plain-cake mix and of commercial mixes. The labor required to prepare the plain-cake mix was added to the cost of the ingredients. The plain-cake mix cost approximately half as much as the commercial mixes.

The cost of ingredients and preparation time for ten layers of cake made from the different mixes was calculated. The cost of the cake made from the plain-cake mix was approximately two-thirds of the cost of cake made from commercial mixes.

An average of 36 min. was required to weigh the ingredients and prepare the mix for a 60-layer quantity of mix. To weigh and mix the ingredients for a 10-layer quantity of cake batter required an average of 16 min. On this basis, the average total time required to make the mix and batter for 10 layers of cake was 22 min. An average of 30 min. was required to weigh the ingredients and prepare the batter for 10 layers of cake made by the conventional method.

SUMMARY

A study was undertaken to develop a quantity formula and method of preparing cake mix and batter from the mix. Judges' comments and ratings of the cakes served as a basis for the selection of the formula. Three methods of adding the liquid ingredients to the mix were studied and a two-stage method was found the most satisfactory and the easiest to perform. With this method, the eggs, vanilla, and half of the water were added to the mix and blended, and then the remaining water was added and blended.

The cake mix was prepared in 10-, 30-, and 60-layer quantities while the cake batters from the mix were prepared in 10-, 20-, and 30-layer quantities. The quantity in which the mix and batters were prepared did not affect the quality of the cake.

There was a saving of time through the use of the mix. The cost of preparing cakes from the plain-cake mix was less than the cost of cakes made from commercial mixes.

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FAO Milk Program for Portuguese Children

Milk is the number one nutritional need in Portugal today. Supplies are so inadequate that many of the nation's children receive no milk at all. These facts come from the report of Technical Assistance Expert of the Food and Agriculture Organization, Nora M. Bottomley, who has been studying the nutritional needs of Portugal. In her report, she recommends the following fourfold plan: (a) establishment of an effective training program for nonmedical nutrition workers; (b) a government-sponsored and administered school feeding program; (c) an intensive survey to determine ways of improving present milk supplies and stimulate production, and introduction, if feasible, of milk processing plants in appropriate locations; and (d) an immediate investigation into the matter of reducing fish losses (fish are being destroyed to keep prices high) and the possibility of processing such quantities of fish as might be available for use in the children's feeding program and later, perhaps, in other food programs.

The total quantity of fresh and processed milk at present available for yearly consumption, according to the 1948–49 Food Balance Sheet, is 11,922 kg. This means that the vulnerable groups could not receive even restricted allowances—even if milk were available to no one else. Chief milk resources are in northern Portugal and in the Azores. However, large-scale distribution is impossible because no milk-processing plant exists in either area to convert the milk into a readily transportable form. If installation of milk-processing plants proves to be an economically sound proposition, this plan would be highly satisfactory. Miss Bottomley also states that a basic aim of the school feeding program would be to provide each school child with ¼ to ½ liter (1 to 2 glasses) of milk per day.

Other nutrition deficiencies common to Portugal are: ascorbic acid deficiencies in the north of Portugal due to poor distribution of citrus fruits from the south; lack of vitamin D (cod-liver oil is plentiful, but used very little); and hypoproteinosis. There is less excuse for the last than for any other deficiency, as the destruction of fish and the use of skim milk for animal food still continue.

School feeding, as a result of inadequate equipment and staff and of early cooking and long transportation, usually consists of unattractive dishes which have deteriorated in flavor and nutritive value in transit. The lunch, moreover, consists in most cases of soup and bread, which is also the most common meal in low-income homes.

Miss Bottomley, at the specific request of the Portuguese government, has also compiled an example of a food rationing program for use in case of national emergency.

Ascorbic Acid and Ash in Vegetables Cooked in Stainless Steel Utensils

Variation with Cooking at Three Levels of Water[1]

KATHERINE H. FISHER and MARY L. DODDS, Ph.D.

School of Home Economics, The Pennsylvania State College, State College

BECAUSE of the solubility of some of the vitamins and minerals, the statement "the least amount of cooking water that can be used is best" has become a generalization. One of the benefits of this has been the trend toward the fabrication of utensils of heavy construction made with materials of special heat conductivity and heavy, tight fitting covers, all of which promotes high cooking efficiency. Both vitamins and minerals have been studied with respect to losses under various conditions of food processing. Simultaneous collection of data for these two classes of nutrients, however, has been less frequent. It is of special interest in family-scale portions and such studies have been reported by Hewston and co-workers (1), Krehl and Winters (2), and Oser, Melnick, and Oser (3). This is a report of an investigation of the simultaneous change of ash and reduced ascorbic acid when variable amounts of water were used in cooking twelve vegetables. Home-sized stainless steel utensils with heavy, tight-fitting lids were used.

EXPERIMENTAL PROCEDURE

The following vegetables were chosen for study: carrots, potatoes, sweet potatoes, spinach, Swiss chard, asparagus, broccoli, green beans, green peas, shredded cabbage, cabbage wedges, and summer squash. The vegetables were obtained from the local and college farms or local market, received late in the afternoon, washed, and refrigerated. On the following morning, the total amount of vegetable was thoroughly mixed, and samples were taken for cooking and subsequent analyses.

One-qt. and 4-qt. stainless steel utensils with tight-fitting lids were used for cooking. The approximate area of the bottom of the 1-qt. vessel was 22 sq. in.; the 4-qt., 55 sq. in. This area was a determining factor in the choice of minimum amount of water. The 4-qt. vessel was used in cooking the leafy and bulky vegetables: broccoli, cabbage, spinach, and Swiss chard.

The amount of vegetable used was that specified by Halliday and Noble (4) for four servings. Each vegetable was cooked in three levels of water. The minimum cooking water was predetermined for each vegetable and was that amount which would allow the vegetable to be cooked to the "done" stage and permit a sampling of the liquid for analyses. The maximum was that amount of water which would not boil over during the cooking. The medium was an amount halfway between. No salt was added (Table 1).

A three-by-three Latin square design (5) was followed. Thus the three treatments were replicated three times in order to minimize the effect of time on the ascorbic acid content from the first to the last of the nine cookings. The design is as follows:

A	B	C
B	C	A
C	A	B

where A is the minimum, B the medium, and C the maximum amount of water. The three samples for raw weight were routinely taken after the second, fifth, and eighth cookings.

The cooking was done on electric ranges: the 6- and 9-in. burners were used for the small and large vessels, respectively. The water was weighed into the vessel, the covered vessel was placed on high heat, and the water brought to a boil. The escape of steam was the point at which the vegetable was added. After return to boil, the heat was reduced to "low" and the vegetable was cooked to "doneness." In preliminary testing, the time required to cook each vegetable to doneness at each level of water

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was determined, and the workers adhered to this time.

The contents of the vessel were weighed and the vegetable was drained in an aluminum colander for 30 seconds at each of three angles. The weight of the cooked vegetable and drained liquid were determined (Table 1).

The raw and cooked vegetable and the liquid from cookings were assayed for reduced ascorbic acid. The vegetable samples were blended in a 1:6 ratio with 1 per cent oxalic acid for 2 min. in a Waring Blendor, then filtered. The liquid samples after stabilization with oxalic acid to a final concentration of 0.5 to 1.0 per cent oxalic acid were filtered without blending. Reduced ascorbic acid was determined by the method of Robinson and Stotz (6), a xylene extraction of the unreacted 2,6 dichlorophenolindophenol dye. The xylene-dye complex was measured in an Evelyn photoelectric colorimeter.

For the ash analyses, the samples were air-dried at 80° to 85°C. to constant weight, then ashed in a muffle furnace at approximately 600°C. to a white ash. Ash was determined on the vegetable and liquid from each cooked sample and the raw sample (Table 2).

RESULTS

All values presented are the average of three samples except that of the raw ash (one sample) (Tables 1 and 2). The data on dry weight are not presented.

The design of the experiment permitted a statistical analysis of results. When analyzed as a typical Latin square, it was found that order within repli-

TABLE 1

Preparation of vegetables

VEGETABLE	PREPARATION	AMOUNT OF COOKING WATER	COOKING TIME	WEIGHT OF RAW SAMPLE	WEIGHT AFTER COOKING		
					Vegetable	Liquid	Vegetable and liquid
		gm.	*min.*	*gm.*	*gm.*	*gm.*	*gm.*
Carrots	scraped; $\frac{1}{8}$-in. cross sections	60	18	325	307.6	55.3	362.9
		150	14		308.5	128.2	436.7
		240	13		315.3	219.7	535.0
Potatoes	picked for uniformity in size; pared and cut into quarters	60	18	300	302.9	37.7	340.6
		150	15		307.9	123.0	430.9
		240	14		307.4	209.8	517.2
Sweet potatoes	picked for uniformity in size; pared and cut into quarters	60	17	300	316.7	37.5	354.2
		150	16		317.0	124.3	441.3
		240	15		317.9	214.2	532.1
Spinach	stems removed; washed and air-dried with fans	100	1	300	289.4	76.4	365.8
		250	(after return		306.2	211.3	517.5
		400	to boil)		311.1	369.2	680.3
Swiss chard	stems not removed; washed and air-dried with fans	100	7	300	297.7	66.4	364.1
		250	5		304.8	213.1	517.9
		400	4		302.9	385.8	688.7
Asparagus	woody ends discarded; cut into 1-in. pieces	30	17	300	288.9	20.4	309.3
		150	10		298.9	132.2	431.1
		240	10		303.4	211.3	514.7
Broccoli	woody ends discarded; split lengthwise into quarters	100	20	300	286.2	31.6	317.8
		250	18		293.8	171.4	465.2
		400	16		294.9	332.9	627.8
Green beans	ends removed; broken into 1-in. pieces	60	15	255	258.6	33.7	292.3
		150	11		266.7	99.8	366.5
		240	10		266.5	197.7	464.2
Green peas	shelled	20	14	350	319.2	35.8	355.0
		100	10		326.4	112.7	439.1
		160	8		340.5	150.8	491.3
Cabbage, shredded	heads uniform in size; shredded—$\frac{1}{4}$ to $\frac{1}{2}$-in. shreds	100	11	240	245.0	38.1	283.1
		250	8		251.2	181.9	433.1
		400	8		247.3	340.0	587.3
Cabbage, wedges	wedges approximately $1\frac{1}{2}$ in. in circumference	100	12	240	244.2	43.2	287.4
		250	10		248.1	191.7	439.8
		400	8		255.5	336.5	592.0
Summer squash	cut into 1-in. cubes	30	18	450	378.1	73.3	451.4
		150	10		400.1	180.0	580.1
		240	9		416.5	256.7	673.2

TABLE 2

Ash and reduced ascorbic acid of vegetables

VEGETABLE	AMOUNT OF COOKING WATER	ASH						ASCORBIC ACID					
		Raw vegetable		Cooked vegetable		Drained liquid	Vegetable and liquid	Raw vegetable		Cooked vegetable		Drained liquid	Vegetable and liquid
		100-gm. portion	Total	100-gm. portion	Total			100-gm. portion	Total	100-gm. portion	Total		
	gm.	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*	*mg.*	*mg.*	*mg.*	*mg.*	*mg.*	*mg.*
Carrots	—	0.68	2.21	—	—	—	—	5.5	18.0	—	—	—	—
	60			0.64	1.96	0.25	2.21			4.1	12.7	3.0	15.7
	150			0.56	1.74	0.47	2.21			4.1	12.8	3.4	16.2
	240			0.51	1.61	0.65	2.26			3.7	11.8	5.5	17.3
Potatoes	—	0.85	2.54	—	—	—	—	20.8	62.5	—	—	—	—
	60			0.76	2.31	0.24	2.55			4.8	14.5	3.7	18.2
	150			0.70	2.16	0.48	2.64			5.5	17.0	10.7	27.7
	240			0.65	2.01	0.61	2.62			5.8	17.8	16.1	33.9
Sweet potatoes	—	1.04	3.12	—	—	—	—	44.3	133.0	—	—	—	—
	60			1.04	3.28	0.23	3.51			37.4	118.6	3.6	122.2
	150			1.01	3.21	0.46	3.67			32.5	103.0	12.3	115.3
	240			0.94	2.99	0.61	3.60			31.6	100.6	14.7	115.3
Spinach	—	1.91	5.73	—	—	—	—	21.5	64.5	—	—	—	—
	100			1.81	5.23	0.76	5.99			8.2	23.8	6.9	30.7
	250			1.51	4.61	1.31	5.92			6.7	20.4	20.6	41.0
	400			1.32	4.11	1.63	5.74			5.1	15.9	16.1	31.0
Swiss chard	—	1.20	3.59	—	—	—	—	28.0	84.0	—	—	—	—
	100			0.98	2.91	0.36	3.27			6.1	18.3	3.4	21.7
	250			0.82	2.49	0.67	3.16			4.5	13.8	6.4	20.2
	400			0.86	2.60	0.82	3.42			5.4	16.4	10.4	26.8
Asparagus	—	0.65	1.95	—	—	—	—	56.7	170.1	—	—	—	—
	30			0.71	2.06	0.13	2.19			53.3	154.0	4.3	158.3
	150			0.59	1.77	0.32	2.09			43.6	130.3	20.0	150.3
	240			0.58	1.77	0.43	2.20			51.5	156.1	32.9	188.9
Broccoli	—	0.77	2.30	—	—	—	—	134.2	402.7	—	—	—	—
	100			0.77	2.20	0.22	2.42			85.0	245.9	10.7	256.6
	250			0.71	2.08	0.47	2.55			72.0	211.6	45.8	257.4
	400			0.62	1.84	0.60	2.44			94.0	277.2	68.3	345.5
Green beans	—	0.74	1.88	—	—	—	—	25.7	65.5	—	—	—	—
	60			0.68	1.76	0.09	1.85			19.5	50.3	3.0	53.3
	150			0.63	1.67	0.18	1.85			18.7	50.0	5.4	55.4
	240			0.57	1.53	0.25	1.78			16.8	44.8	10.2	55.0
Green peas	—	0.75	2.61	—	—	—	—	22.6	79.1	—	—	—	—
	20			0.85	2.71	0.24	2.95			19.1	61.0	4.9	65.9
	100			0.71	2.33	0.34	2.67			17.6	57.3	11.9	69.2
	160			0.70	2.39	0.50	2.89			15.8	53.9	13.9	67.8
Cabbage, shredded	—	0.63	1.51	—	—	—	—	54.0	129.7	—	—	—	—
	100			0.60	1.46	0.14	1.60			44.0	107.7	10.1	117.8
	250			0.46	1.16	0.35	1.51			34.1	85.7	34.5	120.2
	400			0.38	0.93	0.51	1.44			32.4	80.2	52.1	132.3
Cabbage, wedges	—	0.82	1.96	—	—	—	—	55.8	133.8	—	—	—	—
	100			0.54	1.31	0.13	1.44			43.9	107.1	9.6	116.7
	250			0.45	1.11	0.33	1.44			37.7	93.6	29.2	122.8
	400			0.43	1.10	0.40	1.50			41.1	104.9	44.2	149.1
Summer squash	—	0.49	2.20	—	—	—	—	16.6	74.7	—	—	—	—
	30			0.52	1.96	0.34	2.30			9.3	35.1	12.0	47.1
	150			0.47	1.87	0.46	2.33			8.1	32.4	9.9	42.3
	240			0.44	1.84	0.53	2.37			7.9	33.1	9.6	42.7

cation had little bearing on the final results. In order to achieve a more exact analysis of the remaining factors, replication and treatment, a randomized block analysis was used allowing an error term with four degrees of freedom instead of two (Latin square analysis). The F value was used as a criterion of significance for ash (vegetable and liquid) and reduced ascorbic acid (vegetable, liquid, and vegetable plus liquid) (Table 3).

Inspection of the data for carrots, potatoes, and sweet potatoes showed a transfer of reduced ascorbic acid from the vegetable to the liquid (Table 2). This transfer increased as the amount of water was increased, but this loss was not significant in terms of retention. The reduced ascorbic acid in the final system (vegetable plus liquid) was significant only for potatoes and at the 5 per cent level. The greatest destruction in the combined system was that for the minimum treatment. The ascorbic acid in the drained liquid showed a significant change with increase of volume. The ash of the cooked carrots showed a significant difference at the 1 per cent level. That of the potatoes and sweet potatoes was not significant. The three vegetables showed a progressive increase of ash in the drained liquid from the minimum to the maximum treatments. This difference was significant at the 1 per cent level for carrots and potatoes.

TABLE 3

*Statistical summary—test of significance (F value)**

VEGETABLE	SOURCE OF VARIANCE	ASH		REDUCED ASCORBIC ACID		
		Vegetable	Liquid	Vegetable	Liquid	Vegetable and Liquid
Carrots	replication	2.00	0	0.49	1.77	1.22
	treatment	38.00†	48.00†	0.63	26.00†	0.42
Potatoes	replication	4.40	0	0.24	1.64	0.06
	treatment	5.60	40.00†	1.09	7.77*	15.17*
Sweet potatoes	replication	1.56	0.07	1.40	1.42	1.83
	treatment	0.52	0.30	4.03	148.30†	0.63
Spinach	replication	0.20	0.25	0.12	0.72	0.70
	treatment	2.10	28.25†	1.50	9.43*	2.15
Swiss chard	replication	2.98	0.05	2.70	3.90	4.51
	treatment	0.27	2.25	0.81	51.12†	2.30
Asparagus	replication	4.00	0	0.61	2.27	0.74
	treatment	32.00†	13.00*	0.45	38.74†	0.82
Broccoli	replication	0	0	4.80	0.72	4.94
	treatment	34.00†	14.66*	2.62	66.89†	6.48
Green beans	replication	0.50	0	0.60	0.89	0.61
	treatment	2.00	6.00	2.51	22.18†	0.15
Green peas	replication	2.75	0	0.04	17.90*	3.64
	treatment	2.25	22.00†	39.03†	615.45†	11.59*
Cabbage, shredded	replication	0	2.00	0.85	0.39	0.25
	treatment	0.53	42.00†	57.13†	139.92†	21.04†
Cabbage, wedges	replication	1.60	0	0.22	1.24	0.43
	treatment	0.80	11.00*	0.54	110.08†	3.13
Summer squash	replication	1.00	0	0.16	1.53	0.19
	treatment	4.00	10.00*	0.06	0.86	0.29

* 5% level = 6.94.
† 1% level = 18.00.

Statistical analysis showed no difference in the ascorbic acid retained by spinach and Swiss chard by the three treatments, although for spinach the value decreased slightly with increasing amounts of water and for Swiss chard it was irregular. Retention of ascorbic acid in the combined vegetable and liquid was not significantly different due to treatment, and no trends were shown. For spinach, the vitamin retention in the liquid was variable and significant at the 5 per cent level; for Swiss chard, the ascorbic acid in the drained liquid increased with the amount of liquid and was significant at the 1 per cent level. The spinach was exceedingly low in reduced ascorbic acid and out of line with normally expected values, both raw and cooked. The loss of ash by these cooked vegetables with treatment was not significant. The ash for the drained liquid was significant only for spinach.

The cooked, drained green beans showed no significant difference in ascorbic acid retention due to treatment. There was no significant difference in the values of combined vegetable and liquid. For the peas, the trend toward decreased retention with increasing volumes of water in the drained vegetable was significant at the 1 per cent level. This is the only vegetable in the series for which the variance due to replication was significant (5 per cent level). In the combined liquid and vegetable, this difference in ascorbic acid was also significant at the 5 per cent level. The increased solubility of ascorbic acid with increasing volume of water was significant at the 1 per cent level for the drained liquid of the green beans and peas, but the difference in the ash was significant only for the peas (1 per cent level).

The shredded cabbage showed a loss in reduced ascorbic acid due to increasing the water that was significant at the 1 per cent level, and the change in the combined vegetable plus liquid was significant to the same degree. However, for the cabbage wedges, there was no significant ascorbic acid loss in the drained vegetable; the retentions were inconsistent. The combined values showed no significant difference for wedged cabbage. The loss in the liquid fraction was significant at the 1 per cent level for both forms. For the summer squash, no significant difference in ash and ascorbic acid content due to treatment for any fraction was found. The variability of the ash in the vegetable for both the

shredded and wedged cabbage was not significant. The drained liquid of the shredded cabbage showed an increase in ash content with a greater amount of water which was highly significant. That of cabbage wedges and summer squash showed increases significant at the 5 per cent level.

Acceptability Tests

"Doneness" was determined on the basis of the opinion of three or four judges, persons whose professional training is in the field. They judged each cooked product. The vegetables were described as to color and consistency or texture. For the minimum amount of water, all the vegetables were rated desirable as to consistency, but only carrots and summer squash were desirable in appearance; all others were off-color. For the medium quantity of water, all vegetables except summer squash had desirable consistency, and all were desirable in color but shredded and wedged cabbage which were "slightly off-color." For the maximum quantity of water, all were described as desirable in color but eight of the twelve were water-logged.

In the majority of cases, the medium amount of water resulted in a product that was desirable as well as comparable in nutritive value to the other treatments. The two extremes of treatment have disadvantages in terms of acceptability of the cooked vegetable: the maximum treatment often produced a water-logged product while the minimum treatment often resulted in a product that was off-color and unattractive.

DISCUSSION

Biologic material presents special difficulties in sampling. This is due in part to variability of unit size, differences from unit to unit and within the unit of the same product, and lability of the components in a respiring system. Peas present discrete units, not all of the same degree of maturity. Broccoli and asparagus, which differ throughout from stem to tip, do not result in so uniform a sample. Illustrations could be multiplied. The representativeness of samples of the different vegetables studied was unequal. The system of replication in this work was used as a means of minimizing these inequalities and variabilities; it cannot equalize them.

Significant differences due to treatment were shown for reduced ascorbic acid in the drained vegetable only for peas and shredded cabbage, both of which have small error terms in the statistical analysis. For the other ten vegetables, this nonsignificance may have been due to a poor sample or to no real difference in the ascorbic acid content. Where this is associated with a large error term, it is implicit to assume that it may be attributed to sampling difficulties. In the ranking of these ten vegetables, the error term decreased in this order: asparagus, broccoli, cabbage wedges, summer squash, sweet potatoes, spinach, Swiss chard, green beans, potatoes, and carrots. The large error terms associated with these vegetables down through summer squash and the obvious difficulties in sampling lead to the opinion that lack of significance for them was involved in sampling problems. Beyond this point, as the error terms decrease, greater confidence is felt that the nonsignificance due to the variable amount of water was real.

The obvious effect of particle size on sampling for reduced ascorbic acid analysis is illustrated by shredded and wedged cabbage. These samples were taken from halves of the same heads and mixed in the best possible manner. For shredded cabbage, the treatment caused significant differences whereas for wedged cabbage, there appeared to be no significant difference with similar ascorbic acid values (Table 2).

The significance due to treatment, which was general for the nutrients of the drained liquid, was evidence of the beneficial effect of homogeneity in sampling. This significance was increased, too, because the amount of nutrient loss was of the same magnitude for the drained vegetable and the drained liquid, yet the total nutrient in these two fractions was very different. The change was important for the smaller nutrient total of the liquid but in general was of no consequence in terms of the total in the cooked and drained vegetable.

The averages are made up of three individual, experimentally-obtained values (Table 2). Each of these was used in the statistical analysis which is not presented. If presented, it would be obvious that generalizations based on the results of any single cooking are inadequate. Additional replications for the difficult-to-sample products would increase significance of results.

The time required for cooking to "doneness" decreased as the amount of cooking water was increased (Table 1), the greatest difference being between the minimum and medium treatments. The minimum treatment, while cutting solubility losses, introduced a factor of prolonged exposure to high temperature. It seems wise to select a cooking method that produces a desirable yet nutritious product. The "medium" amount of water in the two sizes of utensils spread over the bottom of the vessel to a depth of $\frac{1}{4}$ to $\frac{1}{2}$ in. The "minimum" amount commonly recommended is non-specific. It may be that the "medium" amount of this series corresponds to the usual conception of "minimum." These data indicate that there is a minimum which is too drastic for this type of cooking if an all-round acceptable product is to result.

SUMMARY

Heavy stainless steel utensils with tight-fitting lids were used in cooking home-sized portions of the following vegetables: carrots, potatoes, sweet

potatoes, spinach, Swiss chard, asparagus, broccoli, green beans, green peas, shredded cabbage, cabbage wedges, and summer squash. Three levels of water were used for each vegetable. Assays were made for ash and reduced ascorbic acid for the drained vegetable and the drained liquid.

The loss of soluble minerals from the twelve vegetables as measured by ash paralleled the increase in cooking water, but this loss was significant only for carrots, asparagus, and broccoli.

The drained vegetables lost reduced ascorbic acid by solubility as the amount of cooking water was increased. By statistical measure, this loss was significant only for peas and shredded cabbage.

The significance of results is discussed.

The color and consistency of these vegetables showed that the medium amount of water, as defined by the limits of this experiment, produced a desirable yet nutritious product.

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BIOGRAPHICAL NOTES FROM THE HISTORY OF NUTRITION

Sir Joseph Henry Gilbert—August 1, 1817—December 23, 1901

In the history of nutrition there are several examples of such fine teamwork that the names of two men become combined as almost one word. Such an example is Lawes and Gilbert who worked together for fifty-seven years at Rothamstead Experiment Station, England. They were responsible for the often quoted experiments on young pigs which demonstrated clearly that the carbohydrate of food is converted into fat and may be stored as such in the animal body. They showed that sugar and starch have equal value as carbohydrate foods, as well as the error of Liebig's belief that nitrogen was a source of energy for work. These two men made the Rothamstead experiment farm one of the first and foremost centers for investigation on agricultural problems, and their work with feeding of animals laid a firm foundation for some modern concepts of nutrition.

Lawes was the man with practical agricultural knowledge combined with an original mind and keen powers of observation. Gilbert supplemented Lawes. He had the training in analytical chemistry and a knowledge of foreign languages and scientific literature. He was the cautious and painstaking investigator, carefully planning his experiments with many farm animals, checking his data in every way, and gathering many facts before he drew conclusions.

Joseph Henry Gilbert, the son of a Congregational minister, was born at Hull, England, August 1, 1817 and grew up at Nottingham. His mother was the popular author of children's poems.

When fifteen years old, Gilbert lost the sight of one eye through a gunshot wound and was in poor health for some years. In 1838 he entered the University of Glasgow and studied analytical chemistry, materia medica, and botany. The next year he went to the University of London and continued his work in science. In 1840, he went to Giessen to study under Liebig, the great agricultural chemist of the day. After returning to England, he worked as a laboratory assistant and consulting chemist.

At this time Lawes felt that a chemist was needed for the investigations at Rothamstead and Gilbert was recommended to him. On June 1, 1843, Gilbert began his long and scientifically fruitful partnership with Lawes. Daily results, plans for new experiments, and drafts of all reports were discussed together. Soon a new laboratory was opened and by the time of Gilbert's death, ten volumes of Rothamstead reports had been published.

In 1893, Gilbert was knighted at the Jubilee celebrations at Rothamstead Experiment Station. Many other honors came to him. He visited the United States and Canada on three different occasions (1882, 1884, 1893) to attend scientific meetings and on the last visit lectured at Massachusetts Agricultural College at Amherst. It is interesting that in 1881 Gilbert wrote about the lower digestibility of wholegrain flour and bread and that it was, therefore, not more nutritious than white bread.

He died December 23, 1901, at eighty-five years of age.

REFERENCE: Hall, A. D.: The Book of Rothamstead Experiments. 2nd ed. New York: E. P. Dutton & Co., 1917.—*Contributed by E. Neige Todhunter, Ph.D., Head, Department of Foods and Nutrition, University of Alabama, Tuscaloosa.*

Current Comment

CALORIC VALUE OF DIABETIC DIETS

MAME DENTLER[1]

Montgomery Ward Clinics, Northwestern University Medical School, Chicago

For several years, the Welfare Council of Metropolitan Chicago has made therapeutic diets available for the use of physicians in office practice or in outpatient clinics and for welfare agencies. These diets have been planned for city-wide use with low-income patients or those receiving assistance from welfare agencies. All are adaptations of the normal diet and meet the Recommended Dietary Allowances of the Food and Nutrition Board (1). The normal diet, on which the therapeutic diets are based, was planned to meet the daily needs of the "moderately active man" by providing 3000 calories. Suggestions are given for adjustments for sex and age differences. However, diets for pregnancy and lactation are based on the actual Recommended Dietary Allowances, rather than adjustments.

These therapeutic diets have recently been undergoing revision by a committee composed of dietitians and nutritionists from private and public agencies and welfare groups, who have been using them in their work with patients. The final revisions have been approved by the Chicago Medical Society and now form the basis for calculating the cost of food and determining whether extra money is needed from welfare agencies for the purchase of a special diet.

As the diets were being revised, several questions arose in connection with the diabetic diet, which it was thought might be of interest to others working with similar groups in other communities. Since the committee wished to keep the number of special diets to a minimum, one basic diet for diabetic patients was planned similar to that of the simplified method for calculating the diabetic diet of the American Diabetes Association, The American Dietetic Association, and the Diabetes Section, U. S. Public Health Service (2).

It was felt that the diet should be one which could be adjusted to meet the needs of the individual with a minimum of calculation. It should be possible to modify the caloric value by making additions to or subtractions from the number of portions of carbohydrates and fats, at the same time assuring a diet adequate in other nutrients.

[1] Chairman, Committee on Revision of the Diabetic Diet, Welfare Council of Metropolitan Chicago.

Thus the problem of the caloric value of the basic diabetic diet arose. Should it be the 3000-calorie diet for the moderately active man as used in the normal diet? How many of the diabetic patients who come to clinics are employed and/or physically active? Many were not working, as evidenced by their attendance at the clinics or their support from a public agency. Thus, the committee felt that the 3000-calorie diet might be far too high for the majority and would frequently entail a lowering of the caloric value. Extensive revision of this kind would mean time-consuming and laborious calculation.

To determine the caloric value that would most frequently be ordered, a survey was conducted in four clinics which served patients of a similar economic level. All adult diabetic patients who came to the four clinics during a two-week period in the summer of 1950 were included in the study. The age, sex, and caloric value of the diet prescribed for the patient were recorded, together with information on occupation or activity. To be classified as "working" meant to be employed gainfully. Women who kept house in a small city apartment were considered sedentary. The few patients under twenty years of age were all classified as "physically active" or "working." The number of patients reported by each of the four clinics is given in Table 1.

TABLE 1

Number of patients, by sex, attending four clinics

CLINIC	MEN	WOMEN	TOTAL
Central Free Dispensary	28	55	83
Clinic of Illinois Research Hospital	18	45	63
Mercy Free Dispensary	14	51	65
Montgomery Ward Clinics, Northwestern University	16	40	56
Total	76	191	267

In Table 2, the data are summarized as to the ages of the patients and their caloric intakes. No information was obtained as to the number who were taking insulin. Of the 267 patients studied, 43, or 16 per cent, were working or could be classified as physically active. It was found that 203, or 76 per cent, were on diets which fell between 1200 and 2000 calories. To determine whether there was a weighting in any caloric level by one clinic, the data were summarized by clinics. This was found not to be the case, although there may have been some weighting in the 1200- to 1500-calorie group, since a large percentage

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Calcium	0.24 Gm.	0.5 Gm.
Phosphorus	0.27 Gm.	0.4 Gm.
Iron	1.5 mg.	4.4 mg.
Vitamin A	843 I.U.	1745 I.U.
Thiamine	0.12 mg.	0.7 mg.
Riboflavin	0.45 mg.	1.6 mg.
Niacin	0.2 mg.	6.4 mg.
Ascorbic Acid	2.0 mg.	26.4 mg.
Vitamin D	30 I.U.	150 I.U.
Calories	233	237

*Eggnog nutritive values from Bowes, A. de P., and Church, C. F.: Food Values of Portions Commonly Used, ed. 7, Philadelphia, College Offset Press, 1951.

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TABLE 2

Distribution according to caloric intake of patients attending four Chicago clinics

AGE	NUMBER WORKING	TOTAL NUMBER	DAILY CALORIC INTAKE															
			Less than 1000	1000–1099	1100–1199	1200–1299	1300–1399	1400–1499	1500–1599	1600–1699	1700–1799	1800–1899	1900–1999	2000–2099	2100–2199	2200–2499	2500–2999	3000 and over
Women																		
Less than 20 years	0	2					1			1								
20–29 years	1	6				1		2			1		1		1			
30–39 years	1	10				5		1		2	1		1					
40–49 years	4	25		2	2	5	4	4		2	1	1	3	1				
50–59 years	9	66	1	3	3	14	9	7	8	6	4	5	3	1		1	1	
60–69 years	7	64		3	3	12	4	11	9	4	5	8	3		2			
70 years and over	3	18		1		4		3	4	1	1	3		1				
Total.....	25	191	1	9	8	41	18	28	21	16	13	17	11	3	3	1	1	
Men																		
Less than 20 years	2	2										1					1	
20–29 years	3	5							1					1		2		1
30–39 years	3	6							2	1		1				1	1	
40–49 years	1	4							1		1	1		1				
50–59 years	5	16				3	1		2		5	4					1	
60–69 years	3	29			1	2		1	2	7	2	3	2	4	1	2	2	
70 years and over	1	14					2		1	1	4		2	2		2		
Total.....	18	76			1	5	3	1	9	9	12	10	4	8	1	7	5	1

of diets reported in one clinic were listed as 1280 calories. However, it still remained evident that the majority of diets of patients attending all four clinics were under the 2000-calorie level, with the largest number in the 1200-to-1800 bracket.

With this evidence, it seemed expedient to use a 1500-calorie diet as the basis for the diabetic diet in the revised diet lists. Instructions and exchanges were included so that adjustments could easily be made if the needs of the individual patient varied from this norm.

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Food Preferences of Pre-Army-Age Boys

Nutritional benefits and economy, with all large groups, depend on actual consumption of each food served, which, in turn, depends on preference and palatability.

In 1946–47, work was done at the University of California, Berkeley, on food preferences of boys under Army age, under the direction of the Quartermaster Food and Container Institute for the Armed Forces. One hundred forty-four Northern California boys, ages seventeen through nineteen years, were interviewed for food preferences.

Highest food preference ratings were for: fruits, especially bananas, strawberries, and pineapple; ice cream; pies; steaks; turkey; milk products; and butter. Bananas had the highest rating of any individual food. Lowest scores went to some vegetables, particularly unfamiliar greens; animal organ meats; buttermilk; and red snapper.

The boys' choices generally included hearty breakfasts and lunches and dinners always ending with dessert. Double desserts such as pie à la mode were very popular. Milk was desired with every meal in most cases. Information on preferred methods of preparation was scant. However, although the boys appeared to lack "fussiness" about cooking methods, it is believed that some dislikes would vanish if the foods not liked were properly prepared. —*Abstracted from: Kennedy, B. M.: Food Technol. 6: 93 (March), 1952.*

Chef Marvin Taylor at the Gas range. 1000 meals a day are served to staff and patients at Arlington Community Hospital, North Arlington, Va.

Dietitian Lucile Rice pulls Gas-baked rolls from the oven.

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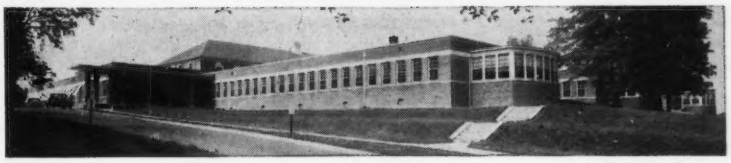

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Book Reviews

Tables of Food Values Recommended for Use in Canada. By the Nutrition Division, Department of National Health and Welfare. Ottawa, Canada: Department of Public Printing and Stationery, 1951. Paper, spiral bound. Pp. 286. Price $1.

This is the second edition of a compilation of food values for use in Canada. Analyses have been worked out for 248 basic foods or food groups with much additional data on the various forms in which a food may be used in individual or family dietaries. Alphabetical order has been used throughout the book. The format makes it easy for a dietitian or nutritionist to use the calculations. References on sources of data are given for each food.

Figures are presented for 1 lb. and for 100 gm. on the basis of As Purchased and Edible Portion values. In addition, much work has been done on average portions and the number of servings available from 1 lb., 1 case, 1 barrel, and from No. 2 and No. 10 cans.

The dietary essentials for which values are given are: calories, protein, fat, carbohydrate, calcium, phosphorus, iron, vitamin A, thiamine, riboflavin, niacin, and ascorbic acid. Vitamin D data per 100 gm. for nine foods are given in a supplementary table.

Few values are given for cooked foods. To assist dietitians in making deductions for cooking losses, however, percentage losses of minerals and vitamins for various forms of cooking are presented in a separate table.

In discussing the selection of figures, the authors point out that "there is scarcely one single food for which complete analyses made in a Canadian laboratory are available. Since Canadian foods are very similar to American foods, permission was obtained to use the compilation recently issued as U. S. Department of Agriculture Handbook No. 8, *Composition of Foods—Raw, Processed, Prepared.* Where Canadian values were available in sufficient range, they have been used in this edition."

The Nutrition Division of the Canadian Department of National Health and Welfare is to be commended for the painstaking efforts this book represents. Its use in dietary calculations throughout the country is an important aid in unifying nutrition work.—*Anna dePlanter Bowes., Chief, Nutrition Division, Pennsylvania Department of Health, Harrisburg.*

Composition of Foods Used in Far Eastern Countries. By Woot-Tsuen Wu Leung, R. K. Pecot, and B. K. Watt. (Agriculture Handbook No. 34) Washington: U. S. Department of Agriculture, 1952. (Order from Government Printing Office, Washington 25.) Paper. Pp. 62. Price 30 cents.

Dr. Watt and her co-workers have performed a great service in gathering and evaluating the data to yield the tables for 362 foods found in this Handbook. It includes not only figures for refuse and proximate composition but also calcium, phosphorus, iron, vitamin A, thiamine, riboflavin, niacin, and ascorbic acid.

In addition to the main table, the introduction gives notes on sources of data, on nutrients, definitions of terms, and two tables: (a) Specific Physiological Energy Factors for Calculating the Calorie Value of Foods and (b) Conversion Factors for Weights Used in Far Eastern Countries. There is also a useful index of scientific and common names and a bibliography of 345 references.

The sections on fruits and vegetables are especially valuable and cover a wide range of foods.

When analyses of foods grown in a particular area are readily available they should be used, since the composite tables of this Handbook cannot be expected to fit every region. For example, the ascorbic acid content of guavas and papaya are not representative of products found in Hawaii. Guavas introduced into the Islands about 1830 have grown uncultivated on all the Islands for many years. Handbook No. 34 gives a value of 300 mg. per 100 gm. of edible guava whereas only occasionally do the wild fruit in Hawaii show values greater than 150 mg., and reports at hand for the Philippines and Malaya give values under 200 mg.

On the other hand, the Handbook value of 56 mg. per 100 gm. for papaya seems low. Studies of the ascorbic acid content of the Solo variety (a small type averaging 1 lb. in weight) grown in Hawaii indicate much higher values. In 1940, fruits collected weekly for eleven months from two groves gave a range of 59 to 122 mg. per 100 gm. with a mean of 84 mg. per 100 gm. for the edible portion. In 1950, assays of 293 fruits from a University grove over a period of eleven months gave a range of 87 to 105 mg. per 100 gm. and a mean value of 97 mg.

This Handbook No. 34 should prove useful not only for dietitians and nutritionists interested in food values but might well be consulted by agriculturists planning production and planting programs in Far Eastern areas.—*Carey D. Miller, Nutritionist, University of Hawaii Agricultural Experiment Station, Honolulu, Oahu, T. H.*

Deficiency Diseases in Japanese Prison Camps. By Dean A. Smith and Michael F. A. Woodruff. Medical Research Council Special Report Series No. 274. London: His Majesty's Stationery Office, 1951. Paper. Pp. 209. Price 6s. 6d. net.

Semistarvation of large segments of a population is a characteristic of war. The major wars of the last several hundred years have produced clinical descriptions of the starving peoples, but it is only in the last decades that biochemical findings and knowledge of the composition of the diet have been combined in the interpretation of the various clinical patterns observed. This monograph is a description of the clinical syndromes observed in a military and two civilian internment camps in South China during the period of Japanese occupation from 1942 to 1945. The food supply is described in detail in relation to the predominance of symptoms from period to period. Since clinical beriberi, as well as other symptomatology thought to be characteristic of deficiency of the B vitamins, occurred in large numbers of internees, this work presents a significant contribution to the differential diagnosis of vitamin deficiency in man. Because of the varying composition of the crude plant extracts and yeast used in treatment, confirmation of diagnosis was possible in certain instances, even though pure vitamin preparations were unavailable. While this volume is of primary usefulness to the doctor of medicine, it is recommended to the clinical dietitian as both interesting reading and as a valuable addition to understanding of deficiency disease and simple caloric underfeeding.—*Margaret A. Ohlson, Ph.D., Head, Department of Foods and Nutrition, Michigan State College, East Lansing.*

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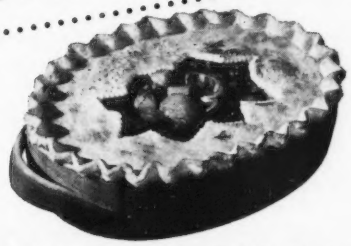

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Current Literature

Contributed by Mildred Bonnell and administrative interns, University of Washington, Seattle; Janette C. Carlsen and Ethel M. Miller, The Johns Hopkins Hospital, Baltimore; Elva Hiscock, Veterans Administration Center, Los Angeles; Pauline Kegereis, The Children's Mercy Hospital, Kansas City, Missouri; Marjorie O'Brien, Franklin Boulevard Community Hospital, Chicago; and the Journal staff

THE AMERICAN JOURNAL OF NURSING

Vol. 52, June, 1952

* Kaffee klatch for nurses.—p. 712.
* The eyes and vitamins. B. Rones.—p. 728.

Coffee Hour for Nurses. Midmorning coffee "breaks" for hospital nurses have become a more and more generally accepted practice in the last five years. A recent "pilot" survey was taken of twenty-four hospitals regarding coffee time. Nearly all hospitals surveyed permitted from 10 to 20 min. for morning coffee; some provided coffee free of charge but many sold not only coffee but other beverages and food. Nurses are generally not supposed to use the break for other purposes, and are strictly forbidden to make coffee in the floor kitchens. While several hospitals believe that nurses abuse the coffee-time privilege, almost all noticed it conspicuously increases the morale and friendliness.

Vision and Vitamins. Vitamin therapy alone will rarely, if ever, cure ocular symptoms occurring in many vitamin deficiency diseases. At best, vitamin therapy is a substitute for finding and eliminating the cause of the disease. Many eye conditions, furthermore, are caused by other than vitamin deficiency diseases. The eye should not be thought of as an isolated organ, but rather as an integral part of the body in which certain general disturbances manifest themselves most clearly. The author stresses the importance to general health of a well-balanced diet fortified by additional vitamins when needed, as opposed to large and sporadic intake of vitamin preparations, because the majority of deficiencies are multiple rather than clear-cut cases due to lack of a single vitamin. Ascorbic acid and vitamins A, B, D, K, and P are discussed in relation to the eye.

AMERICAN JOURNAL OF PUBLIC HEALTH

Vol 42, May, 1952

PART I

* Effect of milk and cream on the thermal inactivation of human poliomyelitis virus. A. S. Kaplan and J. L. Melnick.—p. 525.

PART II

* Chemicals introduced in foods.—p. 122.

Inactivation of Polio Virus. Experiments have shown that the poliomyelitis virus is destroyed by heating for 30 min. at temperatures between 45° and 60°C., but the question arises as to whether the bacteria are rendered more resistant in milk and therefore whether official minimum temperatures for pasteurization (61.7°C. for 30 min. or 71.1°C. for 15 seconds) are adequate for the destruction of various strains of the virus. Studies reported here of the thermal inactivation of human and marine strains of poliomyelitis virus suspended in water, milk, cream, and ice cream indicate that the virus is inactivated in all the mediums by the "standard" methods of pasteurization, with the exception of ice cream by the high-temperature short-time method used in the laboratory. In all methods, heat penetration must be assured for inactivation to take place.

Chemicals Introduced in Foods. The Delaney Committee of the House of Representatives in its report of January, 1951, stated that there were approximately 276 chemicals of the total 800 being used in food today, the safety of which has not been established to the satisfaction of the Food and Drug Administration. In the last year the Committee has made much progress advising and assisting industry and federal and state agencies in further research. It has summarized and evaluated the information and made its conclusions available in usable form to those interested. The Committee has developed guiding principles and standardization procedures essential to safeguard food. It has encouraged and aided the distribution of accurate scientific information to the general public.

THE AMERICAN JOURNAL OF PSYCHIATRY

Vol. 108, March, 1952

* Feeding of patients after termination of insulin coma treatment. E. Revitch and R. Hirschfield.—p. 703.

Feeding after Insulin Coma Therapy. A regimen for meeting the problem of secondary shock, lack of appetite, nausea, and vomiting after termination of insulin coma therapy was worked out at the VA Hospital, Lyons, New Jersey. After arousal, patients receive 14 to 15 oz. 40 per cent glucose, plus a special feeding of 3½ Tbsp. Meritene, 3½ oz. light cream, and 8 oz. vanilla ice cream, which provides: 39.8 gm. carbohydrate, 15.2 gm. protein, 40.3 gm. fat, and 519 calories. After a shower, patients are served a high caloric meal consisting of orange juice, cooked cereal, eggs, bacon, enriched toast, jelly, butter, light cream, milk, and Instant Postum, which is used because of its potassium content. It provides 89.7 gm. carbohydrate, 31.2 gm. protein, 49 gm. fat, and 906 calories. In the evening, patients receive the regular dinner, and at 8 p.m. are served a meat sandwich on bun with butter and lettuce, fruit, and milk. This provides 77.5 gm. carbohydrate, 36.8 gm. protein, 34.5 gm. fat, and 575 calories.

BOLETÍN DE LA OFICINA SANITARIA PANAMERICANA

Vol. 32, April, 1952

* Composición de las plantas alimenticias de la America Central. IV. El Salvador. H. E. Munsell, L. O. Williams, L. P. Guild, C. B. Troescher, G. Nightingale, L. T. Kelley, and R. S. Harris.—p. 293.
* Valor nutritivo de plantas alimenticias de Yucatán. R. O. Cravioto, G. Massieu H., J. Guzmán G., and J. Calvo de la T.—p. 328.

Evaluación de la obesidad-emaciación en el hombre. Normas e interrelaciónes. J. Brožek and A. Keys.—p. 340.

¿A quien corresponde la solución de los problemas de la nutrición? Editoriales.—p. 353.

Composition of Food Plants of El Salvador. In continuing a study of the food value of Latin American plants, 194 samples of foods from El Salvador were analyzed for: moisture, crude fiber, nitrogen, ash, ether extract, calcium, phosphorus, iron, carotene, thiamine, riboflavin, niacin, and ascorbic acid. Some foods were found to be especially rich in certain elements, i.e., the leguminous plant *chipilin* has a high content of calcium, iron, and carotene, as well as moderate amounts of thiamine, riboflavin, and niacin. Its sedative qualities perhaps prohibit its use in great quantities, but its dietary value should not be overlooked. The yucca can provide two elements in large quantities: the tender leaves are a good source of calcium while the flower has large quantities of ascorbic acid.

Nutritive Value of Yucatecan Plants. Results of analyses of 137 specimens of foods of vegetable origin found in the Yucatan peninsula are presented as to: moisture, ash, ether extract, protein, crude fiber, nitrogen, calcium, phosphorus, iron, carotene, thiamine, riboflavin, niacin, and ascorbic acid. Some have not previously been analyzed, among them a fruit known by the Mayan name "uste" or "x' bek-che," which is extremely high in ascorbic acid—2520 mg. per 100 gm., moist value. Differences were observed between varieties studied in this investigation and figures obtained from other regions for the same foods.

ENDOCRINOLOGY

Vol. 50, February, 1952

* The effects of thyroid and of choline and inositol on cholesterol distribution in rats fed a high-

"At Last, I've found a guaranteed WRINKLE REMOVER made especially for us dietitians!"

• Let's face it, gals—worry wrinkles seem to come as standard equipment with the dietitian's job. After all, planning, directing and supervising the preparation and serving of good food is a big job—even when everything moves like clockwork. And you seldom find clockwork routine in any hospital—simply too many variables in the picture. So we get worry wrinkles.

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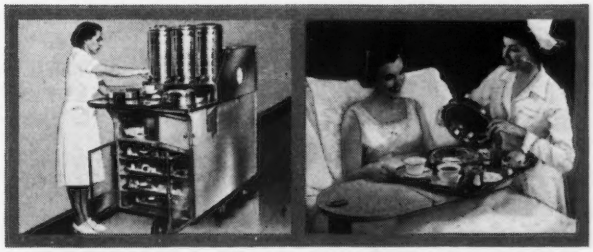

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cholesterol diet. S. B. Weiss, L. Marx, and W. Marx.—p. 192.

* Some effects of cortisone on vitamin C-deficient guinea pigs. E. H. Herrick, E. R. Mead, B. W. Egerton, and J. S. Hughes.—p. 259.

Thyroid, Choline, and Inositol. Rats were fed a purified diet containing 20 per cent fat, 18 per cent casein, and 25/100 per cent bile salts supplemented with 2 per cent cholesterol, 4/10 per cent thyroid, and choline and inositol, either 25/100 or 1 per cent. Plasma and liver cholesterol and total liver lipids were analyzed. It was observed that thyroid diminished significantly the moderate hypercholesterolemia and severe cholesterol and lipid accumulation in the liver of the cholesterol-fed rats. Choline plus inositol produced a marked hypercholesterolemia and a significant drop in hepatic sterol and lipoid values in the group fed the high-cholesterol diet. Combination of endocrine and dietary agents on the plasma sterol were essentially additive.

Effects of Cortisone and Ascorbic Acid. Guinea pigs from which ascorbic acid was withheld developed scurvy with the usual painful joints and degenerating bones and testes. Their life span was only 12 to 19 days. Guinea pigs that received no ascorbic acid, but were given 5 mg. cortisone daily lived from 17 to 45 days on the scorbutic diet and developed no painful joints. Those that received cortisone developed adrenal glands with atrophied cells, shrunken nuclei, few cytoplasmic granules, and decreased lipoidal vaculation.

JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

Vol. 149, May 17, 1952

Intestinal infestation with maggots of the "cheese fly" (Piophila casei). L. E. Peckenschneider, C. Pokorny, and C. A. Hellwig.—p. 262.

Vol. 149, May 24, 1952

* Determination of fat tolerance in patients with myocardial infarction. Method utilizing serum turbidity changes following a fat meal. L. Schwarts, A. Woldow, and R. A. Dunsmore.—p. 364.

* Lipogenesis. Editorials and Comments.—p. 370.

Vol. 149, May 31, 1952

* Nutritive value of processed meats. Queries and Minor Notes.—p. 525.

Vol. 149, June 7, 1952

Occurrence of low salt syndrome during treatment with chloramphenicol. F. J. Catanzaro, A. M. Ostfeld, and G. E. Bergner.—p. 571.

Fat Tolerance in Myocardial Infarction. Using a control group of normal people and another group of patients with coronary atherosclerosis, a series of tests were made on serum turbidity with relation to ingested fat. The tests showed no apparent correlation between the quantity of fat ingested and the resultant serum turbidity in either group.

Lipogenesis. In reviewing recent experiments with isotopic carbon and hydrogen atoms, it is noted that acetic acid was used by animals to form long-chain fatty acids and that myristic acid was used in forming palmitic acid. With *in vitro* experiments, the effects of some hormones on the ability of the liver to synthesize fats were shown.

Processed Meats. The query of a physician as to the nutritive value of such meats as "Spam," scrapple, and frankfurters is answered. The composition is quoted from Bowes and Church, along with the notation that there is some loss due to cooking.

THE JOURNAL OF BIOLOGICAL CHEMISTRY

Vol. 196, May, 1952

* Tryptophan requirement for growth and utilization of its optical isomers. M. J. Oesterling and W. C. Rose.—p. 33.

Studies on copper metabolism. I. A method for the determination of copper in whole blood, red blood cells, and plasma. C. J. Gubler, M. E. Lahey, H. Ashenbrucker, G. E. Cartwright, and M. M. Wintrobe.—p. 209.

Tryptophan Requirement for Growth. L-tryptophan, a natural product which had been isolated from casein, and D-tryptophan, an artificial product, were used in experiments on male rats to determine the growth-promoting properties of the two isomeric compounds. In addition, since tryptophan is known to be used for the synthesis of niacin in the rat, the effect of amino acid was studied. Findings indicate that the minimum requirement of L-tryptophan for adequate growth should be established at 0.20 per cent; that in the absence of niacin, the animal's gain in weight is in direct relationship to the L-tryptophan content of the diet, and that D-tryptophan is distinctly inferior for growth purposes to L-tryptophan. It was further determined that although growth is stimulated by niacin in animals receiving suboptimum amounts of tryptophan, the absence of the vitamin from the diet apparently has no demonstrable effect on the tryptophan requirement.

THE JOURNAL OF THE CANADIAN DIETETIC ASSOCIATION

Vol. 14, June, 1952

Control of obesity in a metabolism unit. W. M. Larsen.—p. 15.

* Attitudes and emotions in the work situation. H. E. Lehman.—p. 18.

Employee Relations. The last two decades have seemed to produce a shift from achievement-pride to efficiency-pride, an attitude which often defeats the task at hand, but which must be understood by the employer who wishes to obtain the utmost in achievement and efficiency from workers. An attitude is defined as a set of ideas and emotions brought already formed into a specific situation while emotions are reactions to and developing out of the situation. The reasons people work and the types of workers are important considerations for the administrator. With an understanding of these factors he should be better able to fit the job to the employee or vice versa. The importance of assuring the worker that he is needed and appreciated and can expect promotion is stressed. Meeting aggression with aggression is usually a sign of the administrator's own inexperience or insecurity. In this period of changing customs, work has lost not only many of its degrading connotations, but also much of its depth and seriousness which might well be restored.

JOURNAL OF HOME ECONOMICS

Vol. 44, June, 1952

* A comparative study of labor costs in three school cafeterias. A. G. Eifler and K. W Harris.—p. 430.

* Cereal enrichment and diets of farm sharecropper families. D. Dickins and O. Sheets.—p. 433.

* Stored foods in a home freezer operated at fluctuating temperatures. F. Ehrenkranz, H. Roberts, and E. S. Ross.—p. 441.

Labor Costs in School Cafeterias. Labor data were collected in three cafeterias of the Altoona, Pennsylvania school system. Hours and wages were assigned to ten work areas: receipt and storage, preparation, service, dishwashing, washing of pots and pans, clean-up, laundry, sewing, office, and checking. Labor cost per customer varied considerably in the three cafeterias, since the number of customers per labor hour differed although the basis for determining the amount of labor used was the same. Figures, presented in tabular form, compare favorably with other school lunch studies.

Cereal Enrichment and Sharecroppers' Diets. In Mississippi since 1944 degerminated cornmeal, white bread, white flour, self-rising flour, and degerminated hominy grits have been enriched by law with iron, thiamine, riboflavin, and niacin. To evaluate the effect of this enrichment on the diets of low-income people in the state, food consumption data were obtained from 223 sharecropper families, largely Negro. The group was divided roughly in half as to dietary study method: the food record method and the recall method. Without enrichment, 50 per cent of the families would have received less than two-thirds of the Recommended Dietary Allowance for riboflavin; 33 per cent of the families, less than two-thirds of the thiamine allowance; 39 per cent, less than two-thirds the niacin allowance; and 18 per cent, less than two-thirds of the iron allowance. However, with enrichment, fewer than 20 per cent of the families received less than the allowances for thiamine, niacin, and iron—although 49 per cent did not receive the allowance for riboflavin and 20 per cent did not receive even two-thirds of the allowance for this nutrient. In actual dietary calculation, it was found that calcium, vitamin A value, and ascorbic acid were the three nutrients in which the proportion of families meeting the allowances was lowest, the low calcium being related to limited milk intake.

Home-Freezer Temperatures. Effects of storage for forty weeks at a constant 0°F. temperature and at fluctuating temperatures of 0° and 10°F. were investigated. Snap beans and strawberries exhibited no significant changes in ascorbic acid or palatability under either set of conditions. However, small but statistically significant changes in palatability were found for frozen beef and pork kept at fluctuating temperatures but none for samples kept at the constant 0°F. storage.

THE

PROTOPECTINS...

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Protopectins, the native form in which pectin exists in certain fruits, can produce many favorable changes in the functional activity of the intestinal tract. These complex carbohydrates readily undergo conversion to pectin in the stomach. After passing into the intestine, the liberated pectin enhances many physiologic mechanisms through its colloidal, chemical, and antibacterial properties.

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Daily intake of protopectin encourages better absorption of essential nutrients. This action is accomplished through a lowering of pH of the intestinal contents, a factor upon which absorption of many nutrients is to a large extent dependent. In the case of calcium, iron, and certain vitamins, this mechanism particularly comes into play. Thus by favoring optimal acidity of the intestinal contents and by exerting a protective action on the intestinal wall, pectin enables the organism to make better use of non-caloric nutrients such as vitamins and minerals, without leading to weight gain.

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THE JOURNAL OF PEDIATRICS

Vol. 40, May, 1952

* The treatment of growth failure in Aleut school children. E. Wilde.—p. 565.

Treatment of Growth Failure in Aleut Children. A series of nine Aleut school children suffering from retarded growth and development were treated with Infa-Concemin with B_{12}. In seven there was an average increase of 65.2 per cent in rate of growth during seven months of treatment as determined by the Wetzel Grid technique.

THE NEW ENGLAND JOURNAL OF MEDICINE

Vol. 246, May 1, 1952

* Medical progress: The significance of cholesterol in the pathogenesis of vascular lesions. S. J. Thannhauser.—p. 605.
* Planning low-sodium meals: A community project. P. A. Thoreson, A. D. Baldwin, E. M. Morris, and W. J. Zukel.—p. 771.

Cholesterol and Vascular Lesions. The mechanism of cholesterol accumulation in the arterial tissue cannot be explained by a one-sided investigation of the physical properties of the lipid constituents and their protein aggregates (lipoproteins) in the plasma. The anatomic and physical properties of the arterial tissue are of equal importance. Two processes of cholesterol accumulation in the arteries should be distinguished: intracellular accumulation in the intimal and subintimal cells, in which cholesterol accumulation in the serum is the primary cause of the arterial lesion, and extracellular precipitation and crystallization in a primarily altered arterial tissue, which occurs independently of the cholesterol level of the serum. Calcium deposition and cholesterol precipitation in the altered arterial wall are probably analogous physicochemical processes secondary to the structural and physical changes of the tissue. Familial hypercholesteremia should be treated with a diet low in cholesterol and neutral fats: around 1700 calories, containing 20 to 30 gm. fat (mainly in the form of pure vegetable fat), 80 gm. protein, and 300 gm. carbohydrates. However, in treating the common type of arteriosclerosis in older people, cholesterol restriction will not have the desired effect. In these cases, a diet low in calories (50 gm. neutral fat), irrespective of its content of cholesterol-bearing foodstuffs, seems to be sufficient.

Low-Sodium Meals. In February 1950, a group of physicians joined official and voluntary health agencies in Newton, Massachusetts, in a cooperative attempt to overcome some of the problems involved in teaching patients to follow nutritionally adequate low-sodium diets. One result was the publication of a diet booklet, *Planning Low-Sodium Meals*. The nine diets listed in this booklet allow for three levels of sodium restriction and three caloric levels for each sodium level. A system of "weighted" values of different foods according to their sodium and caloric content permits the use of food exchanges, giving the patient a wide choice in planning meals. Acceptance of this standardized diet material by physicians and patients has led to a nearly uniform approach to low-sodium-diet education throughout the community. Individual and group diet-education services for patients on low-sodium diets have also been an outgrowth of this project.

PUBLIC HEALTH REPORTS

Vol. 67, May, 1952

* Nutrition for the later years of life. A. Keys.—p. 484.

Nutrition for the Later Years. For older people, nutritional education cannot be stressed too much. Their nutritional knowledge lags far behind that of their younger contemporaries. Emphasis should be placed on practical matters, but the reasons behind the nutritional advice should be explained. Dr. Keys enumerates the important points which should be covered in a nutrition education program for older people.

SOUTHERN MEDICAL JOURNAL

Vol. 45, May, 1952

* The prolonged administration of cation exchange resin as a supplementary measure in congestive heart failure. C. M. Voyles and E. S. Orgain.—p. 439.

Congestive Heart Failure. Seven patients with long-standing, severe congestive heart failure who had responded poorly to conventional methods of treatment, including dietary sodium restriction, were studied during the continuous administration of cation exchange resin, for periods of from six to fourteen months. Various problems pertaining to the use of cation exchange resins are discussed. Frequent determinations were made of serum and urine electrolyte concentrations. Extremely low sodium excretion levels in urine were noted. Serious serum electrolyte disturbances were not encountered during the administration of resin in its ammonium potassium form. Six of the seven patients definitely improved while taking resin, as evidenced by weight, stability, failure to develop edema, improved tolerance to exercise, and lowered requirement of diuretics. It is concluded that the prolonged and continuous, as well as the intermittent use of cation exchange resin is a useful adjunct to the conventional therapy of congestive heart failure, and of other edematous states associated with sodium retention.

THE TOHOKU JOURNAL OF EXPERIMENTAL MEDICINE

Vol. 55, February 25, 1952

* Influence of carbohydrate and fat diet upon the carbohydrate metabolism in rabbits poisoned with alloxan. I. Uyeda.—p. 199.

Influence of Carbohydrate in Diabetes. In Japan, where carbohydrate food predominates, particularly at the present time, the replacement of carbohydrate by fat and protein in the diet of diabetic persons would pose a serious problem. To determine the effect of various diets on the disease, adult male rats, poisoned with alloxan, were fed on either a high-carbohydrate, low-fat diet or a high-fat, low-carbohydrate diet. It was found that the blood sugar contents of the animals were generally the same with the two diets. However, after injections of glucose, there was a tendency for the high-carbohydrate diet to produce a lower glycemia value. The findings seem to be in line with recent recommendations in other countries that a high-carbohydrate, low-fat diet can be used in diabetes.

AMERICAN RESTAURANT MAGAZINE

Vol. 36, June, 1952

* Simplified portion control of 58 best sellers. G. L. Wenzel —p. 42.

Portion Control. Simplified portion control by means of a chart system will be described in twelve articles of which this is the first. Fifty-eight popular food items will be treated. For each, the following five factors will be considered for each of four portion sizes: cost factor, portions per pound A.P., number of portions per unit as purchased, buying specification, and per cent net yield. This article deals with four food items: hamburger sandwich, beef stew, hot roast beef sandwich, and chicken fried steak. The automatic results of the system are outlined as follows: (a) control of purchases through specifications; (b) concentration on the fifty-eight national "best-sellers"; (c) accurate control of portion sizes; (d) provision of simple cost factors for instant pricing; (e) knowledge of the number of cooked portions per pound raw; (f) data on the number of portions obtainable per unit; and (g) provision of the proper percentage of cooked yields per cut.

BAKING INDUSTRY

Vol. 97, May 24, 1952

Here are the bread standards.—p. 41.

* Bread standards analysis . . . what they mean to you. S. W. East.—p. 43.

Bread Standards Affect Bakers. New Food and Drug Administration standards for bread, effective August 13, are analyzed as to actual requirements and prohibitions regarding manufacture and labeling. If dietetic claims for the bread are made on the label, the regulations for foods with a dietary purpose should be consulted. Enriched bread must be noted as such in the actual brand-name and also have on its label the statement: "Eight oz. of this bread provides you with. . . ." A statement "Enriched for better nutrition" can also be added.

FOOD

Processing · Packing · Marketing

Vol. 21, April, 1952

* New chemicals for the food industry.—p. 136.
* Antibiotics and food. Part 2. W. O. Walder.—p. 142.

Chemicals for the Food Industry. Chemical agents in food processing and packaging are discussed, among them:

NOW! An easy-to-prepare lime chiffon pie that can't curdle!

The new Jell-O gelatin way to make chiffon pie takes *most* of the work, *all* the chance out of citrus chiffon pie preparation.

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PEACH WHIP TAPIOCA

Make Jell-O Vanilla Tapioca Pudding as directed on package, chill, turn into sherbet glasses. Top with peach whip, made by whipping at high speed in mixer: 1 egg white, 1 cup drained sweetened peach slices, ¾ cup sugar, 1 tbsp. lemon juice. Garnish with peach slices if desired. Serves 32 at a cost to you of only about . . .

4½¢ TO 5¢ PER SERVING!

LIME CHIFFON PIE

Dissolve 1½ lbs. Lime Jell-O and 2 tsp. salt in 3 qts. hot water. In a double boiler, cook and stir 16 slightly beaten egg yolks, 1 qt. sugar, 2 cups lime juice, and 3 tbsp. grated lime rind. When mixture thickens, remove from heat. Add Jell-O mixture and chill until slightly thickened. Fold into meringue made from 16 egg whites and 2 cups sugar. Chill and stir over crushed ice until well thickened. Turn into 8 baked pie shells. Chill, garnish with whipped cream and chocolate curls, and serve. Costs you only about . . .

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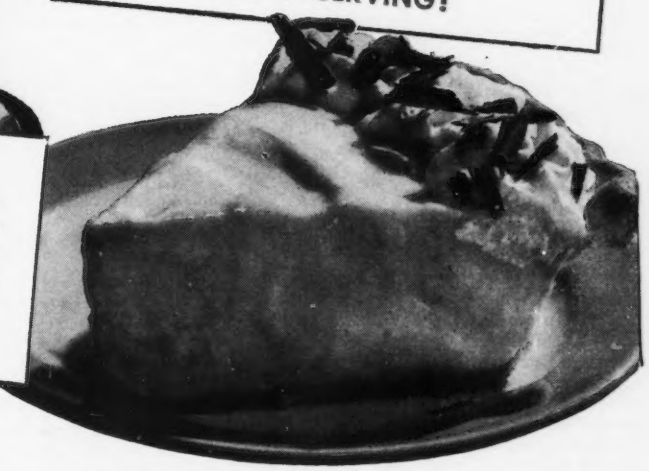

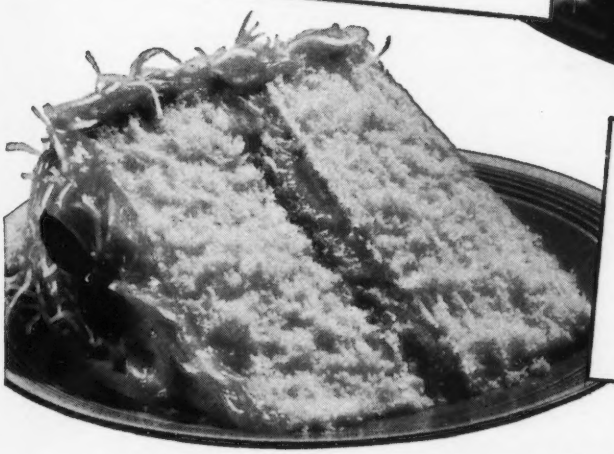

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Antibiotics and Food. Penicillin vs. pathogens in milk, germicidal ice for fish storage, mildew control, and the natural antibiotics formed in higher edible plants are some of the subjects discussed in this article. Four ways are mentioned in which bacteria react to contact with known antibiotics. They are: suppression, habituation, dependence, and stimulation. The latter two produce startling findings at times. The author also comments that there is a great deal more natural antibiosis than was previously thought.

FOOD TECHNOLOGY

Vol. 6, May, 1952

* Development of off-flavor in shelled peas held in cold water. R. U. Makower, M. M. Boggs, and H. K. Barr.—p. 179.

Color measurement as a quality control tool. C. C. Sutton, R. C. Ambler, and D. Arkin.—p. 190.

Ascorbic acid and meat color. B. M. Watts and B. T. Lehmann.—p. 194.

Off-Flavor in Peas. Shelled peas held dry or submerged in water at different temperatures before blanching and freezing were organoleptically inferior to the controls processed immediately after shelling. Off-flavors which developed in submerged samples were much stronger than those in peas held dry, and qualitatively resembled "typical delay off-flavor." In general, the lower the temperature at which peas were held, the less off-flavor was produced.

HOSPITALS

Vol. 26, June, 1952
Part I

* Using an organization chart to ease dietetic management. F. M. O'Brien.—p. 101.

Dietetic Organization Chart. The VA Hospital, Chillicothe, Ohio, has developed a detailed organization chart for the dietetic service. The hospital, a neuropsychiatric facility, has 206 dietary department employees, all of whose names are put in proper position on the 6- by 4-ft. chart which is posted on the wall of the chief dietitian's office. The organization chart provides the following aids to management: over-all view of dietetic activities, a visual aid in recruitment of employees, orientation of new employees, a picture of the supervisory pyramid, advancement possibilities, employee morale, and a workable duty roster. The dietary department employee, therefore, finds the chart an aid to "getting around" and learning his duties and those of others, understands what his next step up might be, is proud to point his place out to visiting friends, and is interested in checking the chart after supervisors' meetings to see who has been promoted and what changes have been made. Inexperienced supervisors benefit by the chart, which increases their knowledge of the pyramid of authority, and experienced ones find it an aid in "briefing" a relief supervisor on a complicated job.

HOTEL MANAGEMENT

Vol. 91, May, 1952

* How to cut your meat costs. A. Easton.—p. 69.
* Turkey. P. P. Logan.—p. 75.

Cutting Meat Costs. Three ways to combat rising meat costs are emphasized: (a) slow cooking to reduce shrinkage, (b) use of flavor boosters, and (c) combining meats with bland foods, such as potatoes, noodles, macaroni, spaghetti, and rice. Ideas for menus are also given.

Turkey. Modern refrigeration, special handling, and feeding has had much to do with the year-round use of turkey. Weight loss in dressing turkeys from live weight is from 8 to 12 per cent, and from 13 to 16 per cent more is lost in drawing. From live to ready-to-cook weight, turkeys lose from 20 to 26 per cent of their weight.

INSTITUTIONS MAGAZINE

Vol. 30, June, 1952

* Instruction wins over sink/swim in staff training. C. H. Broaded.—p. 2.
* Assault and batter bacteria, grime with steam-detergent.—p. 4.
* Discuss accident frequency among institution workers.—p. 151.

Job Instruction Essential. "Sink or swim" was the old-fashioned method of training a new employee: he was exposed to the duties of the job, and it was hoped that technical skills and job knowledge would "rub off" on him. Today the fallacy of this method is acknowledged. The institutional manager or supervisor who knows how to instruct employees will profit through efficient, well-trained, and satisfied employees. Teaching, the author points out, consists of three basic steps: (a) obtain the learner's attention and interest; (b) present information so that it is understood and absorbed; and (c) encourage sufficient practice. Some points the article brings out are: appealing to self-interest to promote job interest, using information and operation sheets where possible, and use of job "breakdowns" by the supervisor.

Steam Cleaning. Users of steam cleaning equipment claim that steam detergent effectively melts away layers of kitchen grease and films of dust at a saving in manhours. Operation of the equipment in one restaurant is described. The manager of the restaurant asserts that an employee can be taught proper use of the steam equipment in one demonstration and that even a woman can handle the hose and nozzle easily. Steam cleaning also preserves the life of kitchen equipment and eliminates the unpleasant chore of cleaning garbage cans by hand.

Workers' Accidents. Psychologic and environmental factors are considered far more important causes of fatigue than muscular effort. Suggestions for reducing these factors among workers include: 10-min. morning and afternoon "breaks"; 5-min. "breaks" every hour for those in monotonous and repetitive jobs; availability of snacks and beverages; friendly interest in workers displayed by supervisors; and education in good health habits including nutrition. Some persons, however, are disproportionately "accident prone" and need physical or psychiatric treatment.

THE MODERN HOSPITAL

Vol. 78, June, 1952

* The dietitian's job is administration, too. S. A. Ferguson.—p. 112.

The Administrative Dietitian. "Plan, organize, and direct" is the author's advice to dietitians who wish to handle the bigger role their administrators desire. He notes that dietitians often do not consider planning as part of their job. They consider it in the administrator's realm. However, dietitians should welcome the chance to bring their specialized knowledge of what a dietary department should be, to the plan of operation of their departments. Moreover, a plan of operation is the basic ingredient of a budget, and the budget follows rather than precedes the service plans which the money will provide. Organization, or carrying out of the plan, is the dietitian's next responsibility, and she must realize that changing conditions require her alertness to see where changes should be made. The third phase of the dietitian's administrative function is directing or operating. This, the part of the job with which dietitians are most familiar, is the biggest part of the job and the part which causes most day-to-day problems; however, it depends for its over-all success on planning and organizing.

WHAT'S NEW IN HOME ECONOMICS

Vol. 16, June, 1952

* Inside Dairyland—U. S. A.—p. 42.

Dairy Products. Factual information on milk and cheese in all varieties is presented in this concise article. Buying information is given on fluid milk in its various forms (pasteurized, homogenized, skim, fermented, and so forth) and concentrated milks are defined and briefly discussed as a guide to buying. Cheese is loosely grouped into soft, semi-hard, and hard. However, it is mentioned in the article that there are between four and five hundred different varieties. Sections on care and practical uses of both milk and cheese are included, and recipes are given using various types of milk and cheese.

Almost 25 per cent of the value of all foods consumed in the U. S. passes through the food service industry, according to George H. Brown, Professor of Marketing, University of Chicago.

NEW...

for low-calorie diets

Tapioca Pudding

1. Dissolve . . . . . 3 saccharin tablets (¼ grain each) in 2 cups skim milk
2. Beat slightly in a saucepan . 1 egg yolk
3. Add milk mixture to the beaten egg yolk a little at a time.
4. Stir in . . . . . ⅛ tsp. salt 3 Tbsp. quick-cooking tapioca
5. Cook over medium heat until mixture comes to a full boil, about 5 to 8 minutes. Stir all the time. Remove from heat.
6. Beat with rotary beater until stiff enough to stand in peaks . . . . . 1 egg white ⅛ tsp. cream of tartar
7. Gradually stir in the hot tapioca mixture.
8. Add . . . . . ½ tsp. vanilla
9. Cool about 20 minutes, then stir to keep egg whites from rising to top. Chill until serving time. Makes 4 servings.

NOTE: Remove egg from refrigerator and separate the yolk from the white while cold — it's easier. Let the egg white stand at room temperature to take the chill off before you beat it — to get greater volume.

Calories in one serving: 89

Free booklet containing

72 dietitian-tested recipes . . . prepared with non-nutritive saccharin.

No doubt about it, the nation is becoming diet-conscious. Doctors and health authorities are constantly driving home the close relationship between surplus weight and poor health.

It is generally agreed, also, that the one satisfactory way for most people to lose weight is to diet, to eat less of the foods that make fat.

You will find this new Monsanto booklet invaluable in low-calorie diet situations. Here are dozens of appetizing sweet dishes, tested and approved by trained dietitians, which are sweetened with *saccharin*, the standard non-nutritive condiment for 50 years. Copies are yours for the asking.

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News Notes

New Internships. Two new dietetic internships were approved by the A.D.A. Executive Board at its meeting on June 12. They are: Walter Reed Army Hospital, Washington, D. C. (Capt. Louise A. K. Frolich, Director); and University of Puerto Rico, Rio Piedras (Josefina Q. de Royo, Director).

Photo Contest Extended. An extension to August 31 of its Second Annual Photographic Contest has been announced by A.D.A. The final date was originally announced as June 15. The contest is open to the general public and no entry fee is required. Photographs must show dietitians or nutritionists at work and should be candid shots telling a story and featuring human interest. Prizes will be cash awards as follows: $75, first; $35, second; $15, third; and 15 prizes of $5 each. The prize winners will be announced in the October issue of the JOURNAL. Entry blanks and rules may be obtained by writing to The American Dietetic Association, Contest Editor, 620 North Michigan Avenue, Chicago 11, Illinois.

Navy Is Recruiting Dietitians. The Bureau of Naval Personnel, U. S. Navy, has instituted a recruiting program designed to procure qualified women dietitians for the Regular Navy and the Naval Reserve. To be eligible, a dietitian must be between the ages of twenty-one and thirty-one and a half years. Professional qualifications include (a) a degree from an accredited college or university with a major in foods and nutrition or institutional management and (b) completion of an approved dietetic internship or three years of experience, one of which must have been in hospitals. In addition, all candidates will be required to take professional examinations designed to test the applicants' knowledge of the basic science in her field.

Selected candidates with a baccalaureate degree will be appointed to the grade of Ensign. Those with a Doctor of Philosophy or Doctor of Science degree will be commissioned Lieutenants Junior Grade. It is not expected that continuous active duty will be available for new appointees under this program. However, upon delivery of commission, appointees may request active duty.

To allow for the commissioning of dietitians, occupational therapists, and physical therapists in the Medical Service Corps of the Regular Navy, and pending enactment of legislation by Congress establishing a Women's Medical Specialist Corps for the Navy, the Secretary of the Navy on February 12, 1952 established a Women's Medical Specialist Section.

Further information may be obtained from the Bureau of Naval Personnel, Washington 25, D. C., or from Navy recruiting stations.

Food and Nutrition Board Meeting. The Food and Nutrition Board met in late April in Washington. At this meeting, Dr. Paul Weiss, Chairman, Division of Biology and Agriculture, reported that a new Committee on Plant and Crop Ecology had been established. Its objective will be to stimulate research and coordinate knowledge of plant life as related to soil, climate, meteorology, and animal and plant vectors of disease, both microscopic and macroscopic.

Also, Dr. Weiss reported that a new Committee on Developmental Biology proposes to assess the knowledge in the field of growth and development of plants, animals, and man, from the standpoint of growth, pathology, sanitation, and public health. Blank spots in the knowledge in this field will be revealed and efforts made to promote research to eliminate them.

Dr. Leroy Voris, Executive Secretary, Food and Nutrition Board, reported that an ad hoc Committee on Low Sodium Diets was set up for the purpose of preparing a report on low-sodium diets, the physiologic principles involved in their use, clinical evidence regarding their effectiveness, other dietary factors possibly involved in hypertension, the sodium content of natural and processed foods, and the planning and administration of low-sodium diets.

Dr. Grace Goldsmith, Chairman, Committee on Dietary Allowances, noted that consideration is being given to the present status of the recommended allowances and some of the newer nutrients. It was the consensus of the committee that the amount of new information made available since the last publication justified the undertaking of a revision of the bulletin. This does not mean that the committee contemplates any drastic changes, but there is a wealth of material which should be included in validating the present recommendations and making some minor changes.

Dr. Josef Brožek, Secretary, Committee on Nutritional Anthropometry, reported plans for preparation of a monograph covering the anthropometric evaluation of nutrition, presenting the basic principles and such standards as are available. The areas requiring further research will be emphasized and the merits and limitations of the different approaches will receive careful scrutiny. A comprehensive bibliography will be included.

Dr. J. E. Rhoads, Chairman, Committee on Therapeutic Nutrition, explained the viewpoint of the members of the Committee as being not so much that an excess of food substance would in general be beneficial to patients, but that the requirement for certain food substances may be altered by a pathologic condition. Publication of the report *Therapeutic Nutrition with Special Reference to Military Situations* led to a number of questions regarding its recommendations for vitamin supplementation, in spite of the statement that these recommendations were more or less a matter of judgment based on the meager information available as to what was required in different illnesses and at different stages of illness.

In reporting at a dinner meeting, Dr. Nevin Scrimshaw, Director of the Institute of Nutrition for Central America and Panama, Guatemala City, pointed out that the problem of endemic goiter is one of the major nutritional problems encountered in Central America. The most practical means of prophylaxis would seem to be the iodization of salt. However, salt is consumed in Central America in a crude, moist form, and the ordinary process for iodization, of course, requires drying, a stabilizer, and special treatment. Thus it is impractical in Central America. In cooperation with the Chilean Iodine Education Bureau, the Institute has demonstrated the effectiveness of potassium iodate in the treatment of endemic goiter. It can be added to salt in the moist form without the problems of stabilization and storage. If the toxicity data at present being examined are satisfactory, iodization of salt with potassium iodate will be recommended for the Central American countries and similar areas.

AHEA Convention. Child nutrition was one topic of emphasis at the annual convention of the American Home Economics Association held in Atlantic City, June 24 to 27. At one session, Florence L. Adrian, Columbus, Ohio, reported on a study of school children's lunches in four Ohio schools.

At another meeting, Kathryne I. Sheehan, Chief of Technical Services for School Lunch, U. S. Department of Agriculture, reported that in 1951–52, participation in the school lunch program reached 9,400,000 children, and that two-thirds of the lunches served were Type A meals.

In discussing nutrition education, Dr. Miriam E. Lowenberg, Head, Department of Foods and Nutrition, The Pennsylvania State College, stressed that "nutrition education in the elementary schools is the most effective way to bring nutrition information to the largest groups of students we have at any level of education. The younger the child, the more easily and completely we can affect his food habits. By reaching children before adolescence and

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Hotel Dyckman, 27 S. Sixth St.	9 blocks	....
Hotel Francis Drake, 10th St. and 5th Ave. So.	5 blocks	....
Hotel Leamington, 10th St. and 4th Ave. So.	2 blocks	....
Hotel Nicollet, Nicollet and Washington	13 blocks	....
Hotel Normandy, 405 S. 8th St.	6 blocks	....
Hotel Radisson, 45 S. 7th St. (Hdqrs.)	8 blocks	....
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helping them to improve their food habits, we can affect the health of the next generation." Dr. Lowenberg was followed by Adele Glass Vincent, nutritionist for the public schools in Dayton, Ohio, who described the school lunch program and goals in Dayton.

Special honorary memberships in the American Home Economics Association were conferred at the meeting on Dr. Lillian Gilbreth, noted time-and motion expert, and Mrs. Raymond J. Sayre, President, Associated Country Women of the World. Nine winners of fellowships and scholarships from foreign countries were also announced. Recipients will come from France, Norway, Denmark, Finland, Australia, the Philippines, Pakistan, England, and Greece.

Officers for the American Home Economics Association for 1952-53 will be:

President—
Elizabeth Sweeney Herbert, Household Equipment Editor, *McCall's Magazine*

Vice-Presidents—
Catherine T. Dennis, North Carolina Department of Public Instruction, Raleigh
Beulah V. Gillaspie, Dean, School of Home Economics, Purdue University, Lafayette, Indiana
Frances Clinton, State Extension Agent, Oregon State College, Corvallis

Treasurer—
Evalyn Bergstrand Owens, Douman, Wisconsin

Secretary—
Jessie McQueens, Home Service Counselor, American Gas Association, New York City

Canadian Dietetic Association Meeting. Vancouver, British Columbia, was the scene of the seventeenth annual convention of the Canadian Dietetic Association, June 10 through 13. Highlight of the meeting was the Violet Ryley-Kathleen Jeffs Foundation Memorial Lecture which was delivered by Florence Reynolds, North American Information Office, Food and Agriculture Organization, who described the work of FAO in helping many countries to gain a more nutritive diet through greater food production and a better understanding of nutrition.

Other features of the program included: a session on "Recent Trends in Food Processing" at which members of the University of British Columbia and local food processors spoke; a panel discussion on "Management's Responsibility in Cost Control," at which Alberta M. Macfarlane, food consultant, was one of the specialists; and a round table on "The Therapeutic Team" at which a dietitian, a nurse, a social worker, and a doctor participated.

Vocational guidance was featured in a talk by Miss Macfarlane, whose title was "Through the Looking Glass—Careers in Home Economics."

A.D.A.'s official representative was Margaret Terrell, University of Washington, Seattle, who spoke on "Cost Control in Food Service."

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New NRA Education Director. On July 15, Kathryne Bruce became Educational Director for the National Restaurant Association. Miss Bruce, a graduate of Southeast Missouri State College, was restaurant manager for Hillman's, Inc., a restaurant-delicatessen chain in Chicago, for seven years prior to her appointment.

Recruiting Plans for Armed Forces. A second meeting of the Subcommittee on Professional Services of the Defense Advisory Committee on Women in the Services was held in New York on May 23. Alta B. Atkinson attended as A.D.A. alternate representative. It was stressed that recruiting for women by the Armed Forces can be expected to continue for several years and involves two types of activities: recruiting for the Armed Forces and recruiting for education in the professions. The need for keeping before the members of professional organizations the needs of the military and also for reaching college students was emphasized. Continued distribution of materials by professional organizations to their members was requested. It was also agreed that the Defense Advisory Committee on Women in the Services should reiterate its initial recommendation about provision of sufficient funds to do the job of recruitment for the services. Recruiting personnel is to be reduced 75 per cent because of cuts in Congressional appropriations.

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You can move into action FASTER, with a STEAM-CHEF. Cooking starts at once—no waiting for water to boil, or for an oven to heat up.

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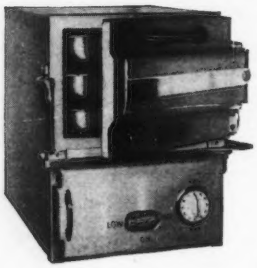
Steam-Chef standard size steamers are made in sizes from 2 to 4 compartments. Steamcraft Junior models are made in 1 or 2 compartment sizes, for counter or table use or mounted on their own bases. Any of these steamers is furnished for direct steam line, or for any kind of gas. Full details from your supply house or us.



3-compartment direct-connected Steam-Chef, equipped with individual compartment clock timers. These timers are optional equipment.

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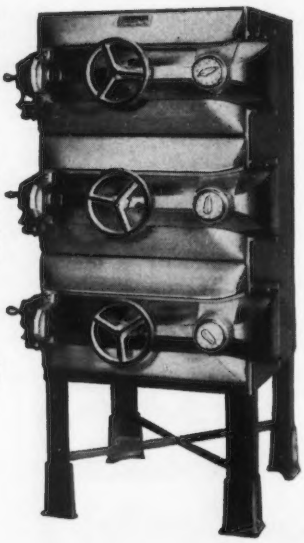

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Borden Award. Dr. Clara A. Storvick, Professor of Foods and Nutrition, Oregon State College, was named as the 1952 winner of the Borden Award for Fundamental Research in the Field of Nutrition and Experimental Foods. Tribute to Dr. Storvick was made at the American Home Economics Association dinner on June 26 by W. A. Wentworth of the Borden Company. Dr. Storvick received the award as recognition of research published since 1946 on ascorbic acid metabolism, dental caries, and nutritional status.

Dr. Hoobler Honored. The Soroptimist Club of Detroit at a banquet on May 22 named Dr. Icie Macy Hoobler, Director, Research Laboratory, Children's Fund of Michigan, "Woman of the Year." Dr. Hoobler is a member of the Food and Nutrition Board of the National Research Council, Chairman of the A.D.A. Committee on Dietary Study Methodology, and a former member of the JOURNAL Board. She is also consultant for Children's Hospital, Detroit, and Secretary of the Detroit Institute of Cancer Research. She was the first woman member of the Engineering Society of Detroit and one of two former women presidents of the American Institute of Nutrition. She holds a degree of Doctor of Philosophy from Yale University and an honorary degree of Doctor of Science from Wayne University, Detroit.

Award Goes to Research Published in *Journal*. Charlotte Biester was recently awarded the Ella Victoria Award of Pi Lambda Theta, honorary education and professional fraternity. Dr. Biester received this recognition for her research on the life of Catharine Beecher, a summary of which was published in the February 1952 issue of the JOURNAL under the title "Catharine Beecher, Founder of Home Economics." Pi Lambda Theta annually makes two awards of $400 each for unpublished research, subject for which can be any aspect of the professional problems and/or contributions of women to either education or some other field. It is believed this is the first time that research in the home economics field has been so honored.

Col. Wickliffe Honored. Winthrop College, Rock Hill, South Carolina, this year named Col. Nell Wickliffe, Chief, Women's Medical Specialist Corps of the Army, as the "outstanding alumna of the year." During commencement exercises on May 31, she was presented with the Mary Mildred Sullivan Award, which is given to those who "by their general conduct and their relations with others indicate they possess to a marked degree a spirit of helpfulness and an awareness of the beauty and value of the intangible elements of life." The award, which consists of a medallion and certificate, was established by the Mary Mildred Sullivan Chapter of the United Daughters of the Confederacy in memory of Mrs. Algernon Sidney Sullivan of New York who worked in behalf of Southern people until her death in 1933 at the age of ninety-seven.

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Plentiful Foods. The U.S.D.A. expects the following foods to be in plentiful supply during August:

Fruits and vegetables

Beans, snap	Peaches, fresh
Corn, sweet	Pears, fresh
Lemon concentrate	Peas, canned and frozen
Limes, fresh	Tomatoes
Orange concentrate	
Oranges, fresh	

Protein foods

Buttermilk	Fish, fresh and frozen
Cheese, Cheddar	Hens, stewing
Cheese, cottage	Milk, nonfat dry solids
Eggs, particularly lower grades	Turkeys

Upper Midwest Hospital Conference. The fifth annual Upper Midwest Hospital Conference was held in St. Paul, May 14 through 16. The dietetic portion of the program included the following:

"Expanding Your Professional Outlook"—Dr. Louise Stedman, University of Minnesota

Panel Discussion: Maintenance and Development of the Dietary Service Conference

"Kitchen Floor Planning and Placing of Equipment"—R. C. Reinecke, Ellerbe and Company, St. Paul

"Kitchen Sanitation"—Harold Adams

"Purchasing Trends and Availability of Equipment"—Walter Randt, Aslesen & Company

Workshop: Cooperative Development of Dietetic Services

"School Lunch: An Integral Part of the Educational Program"—Andrew Taylor, Minnesota Community School Lunch Program

"Some Uses of Group Dynamics in Dietetic Practice"—Mary Brakel, Metabolic Research Clinic, VA Hospital, Hines, Illinois

"Food Needs in Geriatric Nutrition"—Dr. E. L. Tuohy, Duluth Clinic

Panel Discussion: Facets of a Diet Therapy Program

"Teaching Diet Therapy to Nurses from a Nurse's Point of View"—Coordinated by Katharine Denford, Director, University of Minnesota School of Nursing

"Nutrition from the Psychiatrist's Point of View"—Dr. Richard W. Anderson, St. Paul

"The Short Method of Dietary Calculation Based on the New Figures"—Dr. Jane M. Leichsenring, University of Minnesota

The Minnesota Dietetic Association presented an award to a dietetic intern for the essay "The Satisfactions of Being a Dietitian."

Army Recipes for High-Protein Feeding. The Army's Medical Nutrition Laboratory in Chicago has recently issued *Recipes and Menus for High Protein Feeding.* In it are included recipes for 106 dishes, the majority of which are fortified to increase their protein content. In all but a few cases, formulas are given for increasing the protein both by adding natural protein (nonfat dry milk solids) and by using Casec. Quantities are for fifty portions, and portion sizes are given. Quantities of ingredients are listed both as to weight and three types of ordinary measurements, i.e., cups and teaspoons, Army Mess Kit cups, and quarts. The recipes are presented in the usual sections used in cookbooks, i.e., beverages, cakes, cereals, cheese and eggs, cookies, desserts, fish, fruits, gravies, ice creams, meat, pies, poultry, salads and salad dressings, sandwich fillings, sauces, soups, and vegetables. Calculated nutritive value of each recipe is given. In addition, menus for three meals and between-meal nourishments for three days are included, together with calculated protein value. These recipes were developed and tested under the supervision of Jane R. Spinella. The publication is available on request from the Medical Nutrition Laboratory, U. S. Army, 1819 West Pershing Road, Chicago 9.

Eleanor M. Bigelow. The A.D.A. office has been notified of the death on June 3 of Eleanor M. Bigelow. Miss Bigelow, a native of Connecticut, had been an A.D.A. member since 1931. From 1938 until the time of her death she was employed by the Visiting Nurse Association of Philadelphia. She formerly had been on the staff of the Cornell Medical Clinic, New York City. She had been President of the Pennsylvania Dietetic Association.

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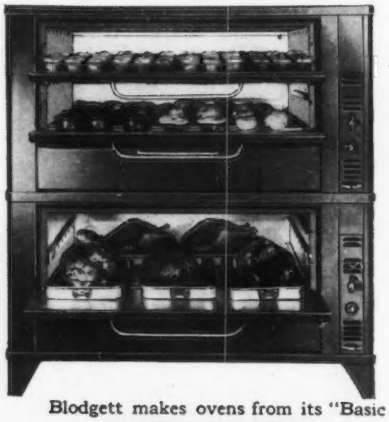

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One deck holds twelve 10 in. pie tins or two 18 x 26 bun pans.

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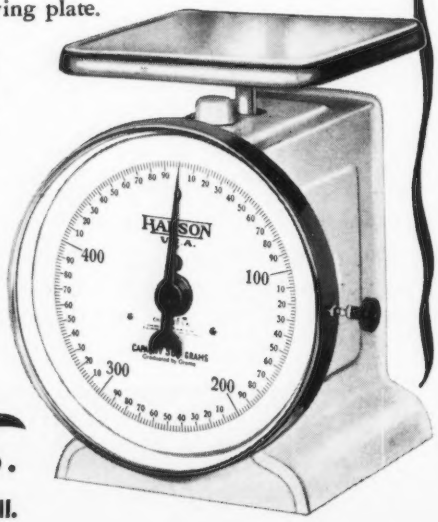

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Katherine Marie Birsner. On June 22, Katherine Marie Birsner died suddenly in Ames, Iowa. Mrs. Birsner, employed by the VA Hospital, Des Moines, had been an A.D.A. member for seventeen years. She had also been on the staff of the Woman's Hospital, Detroit, and Mount Zion Hospital, San Francisco. During the war she served overseas for three and a half years as a first lieutenant in the Army Medical Corps.

Bertha B. Hays. Word has been received in the A.D.A. office of the death this spring of Bertha B. Hays in Mount Vernon, Ohio. Miss Hays, an A.D.A. member since 1940, had been employed by Wilson Memorial Hospital, Sidney, Ohio, and St. Rita's Hospital, Lima, Ohio.

Betty Jean Johnson. Notification of the death of Betty Jean Johnson on December 30 has been received. Miss Johnson, an A.D.A. member since 1943, died at Ann Arbor, Michigan, where she was employed as dietitian and research assistant at the University of Michigan Hospital. She had also been a member of the dietary staff of University Hospital, Columbus, Ohio, and of St. Francis Hospital in Columbus.

Sanitation Foundation Booklet. "Everybody Eats" is the title of a new booklet published by the National Sanitation Foundation, dealing with food protection in institutional or home kitchens. The booklet's "recipe" for food protection is presented in five steps with "basic ingredients" for each. The steps include installation of a well-planned, convenient kitchen with modern equipment; clean, wholesome, properly stored food; properly trained, healthy employees; and a clean and pleasant environment. "Everybody Eats" may be obtained from the National Sanitation Foundation, Ann Arbor, Michigan.

Better Breakfast Month. September will be Better Breakfast Month again this year. The event, sponsored by Cereal Institute, Inc., and first introduced last year, received recognition in the educational, professional, and consumer fields for its success in establishing better breakfast habits. Several states and almost a hundred cities have already conducted Better Breakfast programs.

News of State Associations

Colorado Dietetic Association. On May 9, the Colorado Dietetic Association joined the Colorado State Board of Nurse Examiners in sponsoring a workshop on methods of teaching nutrition to student nurses. The program consisted of both speeches and group discussion.

Doris Odle talked on "Present Trends in the Dietary Needs of the Student Nurse." The second speaker was a student nurse, who explained "What I Would Like to Learn about Nutrition." Another portion of the program was a demonstration of the integrated teaching technique, using a patient with infectious hepatitis as the example.

Bulletin № 1

Secrets of Serving Successful Breakfasts

Familiar Foods—Kellogg's ready-to-eat cereals are familiar favorites in over 80% of U. S. homes. They're ideally packaged in individual servings. And for you, this eliminates waste . . . cuts serving time in kitchens . . . and protects flavor and crispness until packages are opened at mealtime.

*

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In the group discussions, the following topics were covered: "Why Teach Nutrition to Student Nurses?" "What and How to Teach Nutrition"; and "Where to Place Nutrition in the Nursing Curriculum."

Approximately fifty attended the workshop which was held at Presbyterian Hospital, Denver.

Illinois Dietetic Association. Vocational guidance has ranked high in recent Illinois Dietetic Association activities. The members used an A.D.A. three-panel exhibit for the recent Hospitality Day at the University of Illinois—a two-day session for Illinois junior and senior high school girls. *Dietitians in Demand* and "Look Ahead—The Future Is Bright" were distributed. The Illinois Association also has been arranging career day programs in the twenty-two groups of the Illinois Future Homemakers of America. The film, "The Home Economics Story," and the A.D.A. Kodachrome slides have been shown in connection with the programs.

The *Mississippi Valley Dietetic Association* has been occupied with a meeting for home economics teachers and one for students in the Tri-Cities high schools.

Northern Illinois Dietetic Association members recently presented a career program at Evanston Township High School, Evanston, and distributed *Dietitians in Demand* and "Look Ahead—The Future Is Bright" to those attending.

New Appointments, Veterans Administration

The following hospital appointments of dietitians, not previously announced, have been made by the Veterans Administration.

Name	Position	Location
	Boston Area	
Jane C. Grzyboski	Staff Dietitian	West Roxbury, Mass.
Helen R. Vitvitsky	Staff Dietitian	Montrose, N. Y.
Ora E. White	Staff Dietitian	Brooklyn, N. Y.
	Washington, D. C. Area	
Mary L. Allwein	Staff Dietitian	Lebanon, Pa.
Pauline P. Bullick	Staff Dietitian	Ft. Benjamin Harrison, Ind.
Phyllis A. Folda	Head Dietitian	Beckley, W. Va.
Ruth D. Friel	Head Dietitian	Aspinwall, Pa.
Dorothy M. Golden (Reappt.)	Staff Dietitian	Lyons, N. J.
Nancy M. Kneen	Staff Dietitian	Ft. Howard, Md.
Naomi T. Lockard (Reappt.)	Staff Dietitian	Martinsburg, W. Va.
Rita Ortenzo	Staff Dietitian	Aspinwall, Pa.
Elizabeth L. Phillips	Staff Dietitian	Butler, Pa.
Betty Iola Poppenseaker	Assistant Chief Dietitian	Indianapolis, Ind.
Virginia F. Rose	Staff Dietitian	Dayton, Ohio
Priscilla J. Sizemore (Reappt.)	Staff Dietitian	Dayton, Ohio
Adele Super (Reappt.)	Staff Dietitian	Washington, D. C.
Ruth Ann Wagoner	Clinic Dietitian	Cleveland, Ohio, RO Cl.
Charlene E. Walsh (Reappt.)	Staff Dietitian	Lexington, Ky.
	Atlanta Area	
Margaret L. Arthur	Staff Dietitian	Oteen, N. Car.
Gayle J. Boshart	Staff Dietitian	Nashville, Tenn.
Betty Wills Holland	Staff Dietitian	Bay Pines, Fla.
Alta B. Johnson	Staff Dietitian	Chamblee, Ga.
Lillian Lanzi (Reappt.)	Chief Dietitian	Mountain Home, Tenn.
Ruby Sloan Lipscomb (Reappt.)	Staff Dietitian	Columbia, S. Car.
Jean Miller	Staff Dietitian	Coral Gables, Fla.
Marion Z. Perkins	Staff Dietitian	Jackson, Miss.
Florence F. Ward	Staff Dietitian	Columbia, S. Car.
Mae W. Winfield	Staff Dietitian	Tuskegee, Ala.
	St. Louis Area	
Mary Bentz	Staff Dietitian	Albuquerque, N. Mex.
Mary L. Blackbird	Staff Dietitian	Muskogee, Okla.
Elmira Blecha	Instructor in Dietetics	Houston, Tex.
Donna Jean Gunthorpe	Staff Dietitian	Albuquerque, N. Mex.
Martha Ann Hartt	Staff Dietitian	Houston, Tex.
Rose Eva Kissinger (Reappt.)	Staff Dietitian	McKinney, Tex.
Diane B. Mehlbach	Staff Dietitian	Grand Junction, Colo.
Jane Price	Head Dietitian	Houston, Tex.
Dale Randals	Staff Dietitian	Kerrville, Tex.
Eula Fannie Willis (Reappt.)	Staff Dietitian	Kerrville, Tex.
	Ft. Snelling-St. Paul (Minnesota) Area	
Jane Buzzell	Staff Dietitian	Iowa City, Iowa
Lois C. Dutton	Staff Dietitian	Knoxville, Iowa
Genevieve M. Finkh	Head Dietitian	Danville, Ill.
Marie U. Gabriel	Clinic Dietitian	Hines, Ill.
Cressie Rita Halstrom	Staff Dietitian	St. Cloud, Minn.
Sybil White Holton	Clinic Dietitian	Detroit, Mich., RO Cl.
Velma P. Layman (Reappt.)	Staff Dietitian	Sheridan, Wyo.
Anna M. Napolitan	Staff Dietitian	Dearborn, Mich.
Erla Robinson	Staff Dietitian	Downey, Ill.
Marian Valley	Staff Dietitian	Downey, Ill.
	San Francisco Area	
Alice Becker	Head Dietitian	Portland, Ore.
Virginia Brown	Staff Dietitian	Palo Alto, Calif.
Agnes M. Fidati (Reappt.)	Staff Dietitian	Long Beach, Calif.
Rebecca K. Koerting (Reappt.)	Chief Dietitian	Spokane, Wash.
Harriett R. Lamb	Staff Dietitian	Long Beach, Calif.

Kansas Dietetic Association. "Teaching Diet Therapy to Student Nurses" was the theme of the Kansas Dietetic Association's workshop, held in Kansas City on April 24 in connection with the Midwest Hospital Association. Virginia Toews, Educational Dietitian, University of Kansas Medical Center, presented the problem of why student nurses need diet therapy instruction. Groups of ten persons were then formed to solve individual problems. Role-playing by student nurses during the workshop was one technique used.

New Jersey Dietetic Association. "Dietetics at Work" was the exhibit sponsored by the New Jersey Dietetic Association at Hospital Day held in Lyons on May 11. At the meeting, the outstanding dietetic employee at the VA Hospital in Lyons was presented with an award of merit.

The Professional Education Section of the New Jersey Dietetic Association sponsored the program of the May meeting in Newark. Dr. Rita I. Finklea discussed "Past and Present States of Nutrition of South America" and illustrated her talk with slides from her travels in Yucatan and South America.

Ohio Dietetic Association. The *Columbus Dietetic Association* recently co-sponsored a conference on vocational guidance in home economics in conjunction with the Franklin County Home Economics Association and the Home Economists in Business of Columbus. Films related to home economics were shown to the guests, who were vocational advisors in Franklin County high schools and representatives from the Girl Scouts. The three organizations each presented a 20-min. program on the training and the job opportunities in their fields. Kits of vocational guidance materials were given to each guest for her school or organization library.

Pennsylvania Dietetic Association. The *Philadelphia Dietetic Association* reports that the Annual Hospital and Institutional Food Institute was held in Philadelphia on May 15. The program, presented by Jean Burtis, Fish and Wildlife Service, U. S. Department of the Interior, included a demonstration and lecture on the preparation of fish for institutional use. Miss Burtis discussed different species of fish and the manner in which each could best be prepared. She then prepared 25 lb. of fish of various kinds and invited the audience to sample them. Recipes were available in printed form. The meeting was sponsored by the *Philadelphia Dietetic Association*, the Philadelphia Hospital Association, the Hospital Purchasing Service of Pennsylvania, and the Hospital Council of Philadelphia.

Association Activities

A.D.A. Exhibits. A.D.A. displayed the food model exhibit, *The Adequate Low-Calorie Diet*, at the Chicago meeting of the American Medical Association, June 9 to 13. Members of the Chicago

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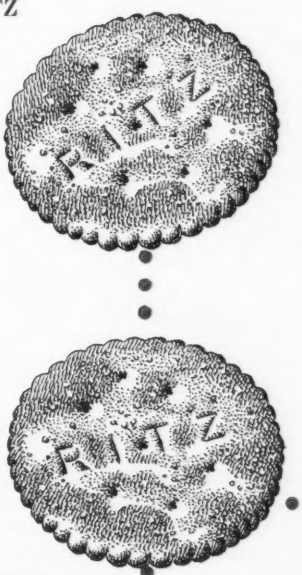

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Dietetic Association were in charge of the booth with Gloria Monteufel and Dorothy Brodnicki, both of Cook County Hospital, serving as co-chairmen.

The Association's new exhibit on achieving and maintaining proper body weight was shown at two major conventions in Atlantic City: the Biennial Nursing Convention, June 16 to 20, and the American Home Economics Association, June 24 to 27. Katharine H. Booth of the New Jersey Dietetic Association was chairman on both occasions, assisted by members of her own association and of the Philadelphia, Pennsylvania, and Greater New York Dietetic Associations. Clara Zempel represented A.D.A. at these two meetings.

Seventh National Conference on Citizenship. Jean Crooks will represent A.D.A. at the Seventh National Conference on Citizenship to be held in the Statler Hotel, Washington, D. C., September 17 to 19. The invitation to have representation was extended by the Acting Attorney General and the National Education Association.

The 82nd Congress passed a Joint Resolution which was signed by the President designating September 17 of each year as "Citizenship Day."

Establishment of Study Panel. Mary W. Northrop attended a panel on training and recruitment of "paramedical" personnel held in Washington, D. C., in June. The panel was one of several established by the President's Commission on the Health Needs of the Nation.

International Dietetic Congress. Dr. Margaret A. Ohlson attended the First International Dietetic Congress in Amsterdam, Holland, July 7 to 11, as the official representative of A.D.A. According to information in the Association office, a total of twenty-eight members from the U. S. were expected to attend, as well as several members serving abroad in the Armed Services. Those attending were:

Fay Anthis	Texas
Margaret R. Becker	Temporarily abroad
Mary K. Bloetjes	Denmark
Mildred Bonnell	Washington
Ethel J. Boyle	Illinois
Dr. Mildred Bricker	California
Helen R. Cahill	Washington, D. C.
Kathryn A. McHenry	Washington, D. C.
Maj. Katherine E. Manchester, (WMSC, USA)	Washington, D. C.
Col. Miriam E. Perry (WMSC, USA)	Washington, D. C.
Violet K. Wallfred	Washington, D. C.
Col. Nell Wickliffe (WMSC, USA)	Washington, D. C.
Margaret L. Fincke	Oregon
Dr. Clara Storvick	Oregon
Georgiean Geanopulos	Delaware
Helen Hauck	Ohio
Helen Robertson	Ohio
Betty A. Hemenway	New Jersey
Dr. Margaret A. Ohlson	Michigan
Dr. Icie Macy Hoobler	Michigan
Capt. Frances M. Horr (WMSC, USAF)	Stationed at Wiesbaden
May Beman McBath	Florida
Alida F. Morse	England
1st Lt. Julia Ruth Moynihan (WMSC, USAF)	Kansas
Helen Ger Olson	Kansas
Martha L. Otto	Minnesota
Cora W. B. Reams, QM Division	
Ila Jane Williamson	Indiana

To help give a better understanding of A.D.A. to other groups at the Congress, the Association exhibited issues of the JOURNAL, vocational guidance material, and other A.D.A. publications. Several informative sheets about A.D.A. were printed in English and French for distribution. Each official representative of a foreign dietetic association was presented with a packet of such vocational guidance pamphlets and information concerning A.D.A.

Saffron

Big in prestige, if not in volume, saffron is a valuable adjunct for the spice industry and for many consumers. The yellow-orange powder is used mostly in baking coffee breads and cakes, but it is also used for saffron rice and can be helpful in such dishes as stewed chicken.

Crocus sativus is the source of true saffron. The plant is cultivated in Austria, Spain, Greece, England, and the Orient, and in the United States for ornamentation. The spice is made of the orange-red stigmas of the crocus flower. One reason for its comparative scarcity is the fact that 100,000 plants are needed to produce 1 kg. dried powder. Mexican saffron is not the true saffron; it is an annual herb of the temperate tableland in central Mexico.

Saffron was used by the ancient Greeks and Romans for culinary, dyeing, perfume, cosmetic, and medicinal purposes. In old Ireland, the king's mantle was dyed with it. England, in the Middle Ages, used saffron liberally in food; in fact *The Form of Cury*, a fourteenth-century cookbook prepared by the master cooks of Richard II, and other cookbooks of the century, used it in approximately half their recipes. In those times, saffron was not only England's most esteemed spice, but one of its chief trade commodities. In British salad-making, flowers played an important part. In Thomas Tusser's "Seeds and Herbs for the Kitchen," not only saffron but marigolds, primroses, and violets were listed, and in other books of the time roses and cowslips were suggested.

Saffron still plays a part in English cookery. However, the saffron buns characteristic of Cornwall are a trifle more to modern taste than a fourteenth-century pudding, the recipe for which reads: "Take hens and pork, and boil them together. Hew the flesh small, and grind it all to dust. Take grated bread and mix it with the broth and add it to the yolks of eggs. Boil it and put therein powdered ginger, saffron, sugars, and salt, and look that it be stiff."

Francis Bacon was known to say of saffron, "It maketh the English sprightly." Culpeper, the British herbalist, in his *English Physician* (1653) rhapsodized on the herb as follows: ". . . an herb of Sun, and under the Lion, and therefore you need not demand a reason why it strengthens the heart so exceedingly. Let not above ten grains be given at a time, for if the Sun, which is the fountain of life, may dazzle the eyes and make them blind, a cordial being taken in an immoderate quantity may hurt the heart instead of helping it. It quickeneth the brain, helps consumption of the lungs, helps difficulty of breathing. It is an excellent thing in epidemical diseases, as pestilence, small-pox, and measles. It is an expulsive medicine, and a notable remedy of the jellow (sic) jaundice."

While modern cooks might not be as enthusiastic as Culpeper and his contemporaries, it is believed that the small percentage of United States consumers who use saffron could be considerably increased by wider acquaintance with the herb.—*Excerpted from: Schweisheimer, W.: The Saffron Story. Coffee and Tea Industries and The Flavor Field 75: 59 (March), 1952.*